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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Current Issue.

This month Mr. Edmund Jarvis presents additional data on the possibilities of hydro-cyanic gas as a fumigant for use in checking the cane-grub pest. Other activities of the officers of the Bureau of Sugar Experiment Stations are described interestingly. Mr. C. T. White discusses the possibilities of camphor cultivation in Queensland; while Mr. Shelton has chosen for this month's contribution some useful notes on the British Large Black pig. In the course of a short review of seasonal wheat crop prospects, Mr. Quodling strikes an optimistic note. A valuable description of Queensland trees is continued by Mr. White and Mr. Francis, while among the special features of this issue is a paper describing a universal indexing system for wood, which was read by Mr. Swain, Director of Forests, before the recent Science Congress at Adelaide. A plea for the preservation of our native birds is put forth by Mr. Kinghorn, a well-known ornithologist, in the course of a reprinted article. Maize growers will be interested especially in Mr. C. McKeon's notes on seed maize improvement, which are enhanced by some remarkably fine plates. Regular features cover the same broad field, and, as usual, the photographer's art in relation to rural subjects is well represented.

Standardised Wheats.

The Field Branch of the Department of Agriculture and Stock has brought to maturity a scheme for the standardisation of varieties of wheat grown in Queensland. The project covers the co-ordination of the departmental wheat-breeding and wheat-testing work and its linking with the activities of the State Wheat Board. The scientific and technical work necessary to give effect to the scheme will be carried out by the Department as at present, and, when seed of improved varieties recommended by the Department is available from time to time in sufficient quantities, it has been planned that the Board shall take it over by purchase, at a price agreed upon mutually, and shall arrange for sowing the respective varieties in localities and

on picked areas recommended as suitable for the purpose of propagation. The Board, in sequence, is to secure seed from these sources and rail it to its central depôt for cleaning, fumigation, grading, and storing for ultimate despatch to localities decided upon as the most suitable for the commercial propagation of specified wheat types. For the purpose of working the scheme successfully, and of the production of standard types of grain, the State wheat areas are to be classified as districts or zones. Local effort will be concentrated accordingly on the growing of suitable types and varieties within each zone. In this way it will be possible to fulfil special milling or export requirements. It is also planned to classify varieties now in cultivation with a view to discarding those that are undesirable or unsuitable for Queensland conditions, or those that are soft, starchy, and of poor milling and keeping qualities. The Board will see that all wheats coming within the category described are duly delivered to it by the grower. In this way the usual reservations or arrangements for the following season's seed by the grower will be in line with the policy of standardisation. Approved seed wheats will, of course, be supplied by the Board, in lieu of the discarded varieties. With a view to ensuring the preservation of supplies of pure seed of varieties finally approved under the scheme, the Department will continue the work of seed selection by maintaining small nursery plots at its wheat-breeding establishments, or on other farms. Another object is the improvement by selection and the maintenance of certain strains within the respective varieties, which may be drawn upon should the identity or purity to type of the original varieties require to be renewed at any time. The active co-operation of seedsmen dealing in seed wheat is also being sought in connection with the scheme, in order that they may assist in placing varieties with growers in the districts or zones in which local conditions are considered most suitable for the varieties respectively allotted. The scheme generally is a practical one, and its effective working must have a wide influence on the future of the wheat-growing industry in Queensland.

Wheat Improvement.

Greater difficulty exists in Queensland in securing standard types of wheat than in any other State. A variety must possess certain characteristics before it becomes popular with growers. It must be rust and drought resistant, of good milling quality, possess a firm, upright, and strong walled straw, a minimum amount of flag, and a good, strong root system. It must also mature quickly, ripen evenly, be level headed in crop, possess a good, well-developed ear, have a capacity to hold grain without shedding it in the field, be easy to harvest, not too tough to thresh, and, lastly, it must be prolific in yield. For a quarter of a century the Department has carried on wheat trials and experiments with an aim of standardising types for different districts. For the last fifteen years wheat-breeding has been carried on at Roma by Mr. R. E. Soutter; and to increase the value of this work to growers progressive tests, such as those at present undergoing observation at Allora, are being carried out by the Agricultural Field Branch. It takes several seasons of variable conditions to thoroughly test a new variety to admit of a comparison being made of the behaviour and suitability of individual strains, and their adaptability to differing soils and environment. The work is progressive and calls for close observation and care to ensure the best results. As a result of long continued effort, many new and valuable wheats have been brought into cultivation by the Department, some being bred at the Hermitage State Farm—namely Bunge, Amby, Coronation, Piastre, Hermitage, and Plainsman. The Roma State Farm has also brought out some excellent varieties in Roma Reds, Cedric, Warchief, Warrior, Novo, Inglewood, Gundi, and B.I.P. The adaptability of these varieties and their yielding capacity may be gauged from results obtained on the Downs by growers who have co-operated with the Department. Average acreage yields were in some instances over 27 bushels. Over the whole plotted area, 523 acres, the average yield was over 22 bushels to the acre in spite of seasonal difficulties. The highest yield recorded —this was in the course of the season before last—was 40 bushels (Roma Red 2) in the Allora district. In that locality comparative tests of several varieties of departmental wheats are now being made under field conditions on 3-acre areas. Fertiliser tests are at the same time being carried on by the Field Branch and results are awaited with great interest. The story of the development of wheat-growing in Queensland is a romantic chapter in our agricultural history. Our wheat breeders and field men who are fully and truly imbued with the spirit of Farrar to whose genius and perseverance Australians will yet raise a monument worthy of his great service to agriculture, to commerce, and to the Commonwealth.

Bureau of Sugar Experiment Stations.

FIELD REPORTS.

The Southern Field Assistant (Mr. J. C. Murray) reports to the Director (Mr. H. T. Easterby) under date 17th September, 1924:—

Childers.

Harvesting is in full swing, and mills are working at high pressure, with no industrial trouble. A general atmosphere of prosperity pervades the countryside, and growers generally are adopting the attitude of "sit up and take notice" more than hitherto. This is particularly noticeable with regard to soil improvement. Green crops for manure are being more extensively used, also deeper cultivation. Farmers are advised that on this soil Mauritius bean and cowpea are the best green-manuring crops. Mauritius bean has been proved to be the best green manure for typical red volcanic soils, such as prevail in the Isis and Woongarra areas. For further information on this point advice may be obtained from the Director of Sugar Experiment Stations.

There is still a great deal of work to be done by the growers here in respect to local experiment as a means of determining correct fertilisers. It is an everyday occurrence to meet a farmer who complains that he has invested a considerable sum in fertiliser with no results. This should not occur, unless drought conditions followed the application, if the correct mixture were applied. If a grower finds it not convenient to establish a plot for experiment, it is suggested that, when planting, he obtains a little of each of the standard fertilisers on the market and uses, say, a chain of half a dozen rows for experiment. This point has been stressed before, but is of so much importance that it is excusable to make repetition.

Cane varieties that are proving the greatest commercial value are Q.813, M.1900 Seedling, and H.Q.285. The lastnamed has frequently been recommended to growers since 1918 as a useful cane for this district, and gradually the planting of it has been extended with very satisfactory results.

A collection of varieties has been distributed at Huxley by the Colonial Sugar Refining Company. The writer is not yet familiar with their habits and manner of growth. They appear to be making satisfactory progress.

With the exception of a small area at Huxley under M.1900 Seedling, there is generally a healthy appearance about the cane in the Isis district.

Where disease occurs in old farm lands with any degree of frequency, it is best to give the land a rest from canegrowing and plough under legumes to restore fertility, and thus give subsequent cane crops that vigorous resistant condition that rarely allows disease to make serious inroads.

There appears to be an impression among farmers that Mosaic disease is new to Queensland. This is erroneous, as it was noticed as early as 1909 in many Queensland fields, the primary symptoms showing in several farms. Its incidence was on the decrease then as the damage done had been noticed by intelligent growers and effectually checked by careful selection. From careful observations it can be positively stated that there is now far less disease taking the form of an infectious chlorosis than there was in 1918. This can be explained by the fact that growers are becoming increasingly alive to the necessity of careful seed selection.

A variety known as B.208 was showing an infectious leaf disease when it was introduced a number of years before the period mentioned. Disease is mainly distributed by unconscious selection of bad plants.

Dallarnil.

Excellent crops are coming from the Dallarnil district this year. Motor lorries for haulage are coming into use, and are greatly facilitating the transport of cane when long haulage is involved.

Varieties giving good results are Q.813, D.1135, Rappoe, and Singapore. The firstnamed is recommended to be more extensively planted, also H.Q.285. The soil at present has abundant fertility. In order to maintain this condition, however, the farmers are recommended to maintain the fertility of their soil by green manuring wherever possible.

Dallarnil is a district of considerable possibilities. In addition to cane, the land is suitable for the growing of cotton, fodder crops, and grasses. The countryside is picturesque, and there is still plenty of room for rural expansion.

Booval.

This area is expanding, and affords a good example of how people will readily develop the land if there is a chance of making a fair living for themselves and their dependants. Harvesting operations are in full swing, growers being busily engaged in hauling to the railway siding.

The farming generally is good. The forest land would be improved by deeper cultivation and longer fallowing; lime and green manure would be beneficial on the majority of the farms that are accessible to cultural operations. The reaction of the soil is slightly acid. Samples of scrub and forest loams were taken for analyses.

Deep ploughing in the average land at Booval is to be recommended. If shallow cultivation is done, the substrata retains too much moisture after the rain and this favours the attack of indigenous fungoid parasites on the roots of the cane. If the substrata is turned up and exposed for a time it is probable the growers will have less trouble with root-destroying fungi.

Cane varieties recommended are M.1900 Seedling, H.Q.285, Q.813, and H.227. The lastnamed stands frost conditions well and should be a useful cane on low lands. This variety bears a resemblance to D.1135 in a number of characteristics.

Goodwood.

Cane is cutting well at Goodwood, especially the M.1900 Seedling. Other canes giving good results are Q.813 and H.Q.285. Land is being broken up and made ready for planting. Harvesting operations are proceeding smoothly.

The cane generally is healthy, no serious spread of disease showing. M.1900 Seedling appears to exhibit unhealthy symptoms more than the other canes, and growers are advised to work with the other two varieties mentioned on land that has been cropping the Mauritius Seedling for a number of years.

Maryborough.

Cane crops are cutting well. Areas are being extended, and it appears at present as if this pioneer sugar-growing district was again coming into prominence as a sugar-producing area. The farmers are a little behind though, in the matter of high density canes. Although there is a fair acreage of M.1900 Seedling and Q.813 growing, farmers are recommended to plant these canes more extensively still, as well as H.Q.285. The order of harvesting could then be H.Q.285 in July and August, Q.813 in September, and M.1900 Seedling over the remainder of the season.

Continuous experiment might be made with other varieties. Canes should be looked at as to their value from the following standpoints:—Sugar content, disease resistance, harvesting qualities, and milling qualities. The three canes mentioned are all commendable from these points of view. It may seem unimportant for a cane to possess harvesting qualities, but a clean, free-trashing cane does not necessitate burning, and on account of the trash falling away during growth does not harbour insects that may act as a media of disease infection. A good milling cane helps the factory to maintain a maximum efficiency, a factor which materially benefits the suppliers.

Other cane varieties making an excellent showing in the Maryborough district are H.Q.227, Q.970, and E.K.28.

Growers are recommended to experiment before extensively fertilising, or submit samples of soil to the Bureau for analyses.

Yerra.

Good crops are coming from this district. All the transport has to be done by the farmers over some very indifferent roads; therefore they are working under more disadvantageous conditions than their fellow producers in better organised areas. There is still a considerable acreage of farm land to be cleared in this district, most of it suitable for general agriculture. In fact, it is probable that this district will finally be cropped with cane, maize, cotton, and fruit.

Cane varieties giving satisfactory results are H.227, Q.970, Q.1098, Q.813, H.Q.285, M.1900 Seedling, and D.1135.

Old soils now being put under cane would be improved by green manures and lime before planting. The soil is of coarse texture with a slightly acid reaction, and is deficient in humus.

Pialba.

As elsewhere, this is the busy time for the Pialba growers. The crops are heavy and the wagon haulage considerable. Efforts are being made to open up the country between Nikenbah and the Mountain with a tramline. The route would involve no big cuttings or bridges and would traverse some fine agricultural country. From the heights known as the Mountain a magnificent panorama of land and sea is visible. The Hummock at Bundaberg can be plainly seen. It was at the Mountain that Mr. Bromley pioneered the coffee-growing industry, his sons still carrying on the work along with cane planting. It is on the Mountain slopes that still beautiful natural jungle parks are to be seen, with the handsome Flindersia showing his head above the jungle.

Growers have been usefully experimenting and have some excellent canes. The most noticeable of the varieties tried are M.1900 Seedling, Q.970, H.227, H.Q.285, Q.1098, Petite Senneville (Mauritius Seedling), Q.813, H.Q.77, M.189, and E.K.28. Two of these canes, H.Q.285 and Q.813, are particularly worthy of note. Growers are recommended to plant these two canes extensively.

On the older Pialba cane lands crops this year are fair, but growers will never get the maximum from these soils until they systematically green manure and lime.

The Northern Field Assistant (Mr. E. H. Osborn) reports to the Director (Mr. H. T. Easterby) under date 22nd September, 1924:—

Innisfail.

For the week ending 23rd August, 4,512 tons of cane, with a c.c.s. of 14.2, were crushed. Generally, the cane was very clean, and some high-density figures were being obtained, especially from Liverpool Creek. Although a large crop is expected, it will hardly be up to the earlier estimates, for a proportion of the late cut cane is unlikely to be harvested.

Density figures on an experimental block on Mr. M. Schilling's farm are interesting:—

Cane.	Class.	Age.	C.C.S.
H.Q. 458	First Ratoon	9 months	10·6
M. 89	First Ratoon	9 months	5·65
E. K. 1	First Ratoon	9 months	7·25
S. Singapore	First Ratoon	10 months	9·1
Q. 813	First Ratoon	10 months	13·45
7 R. 428	Plant	11 months	9 5

For Q.813 13.45 is remarkably good, and confirms the figures obtained from this cane during the first three and a-half weeks of the crushing, when its average density was practically 1½ per cent. more than any other cane going through the rollers. This particular crop was grown upon medium to heavy ground which has been under cane for many years. Very many inquiries are being made for plants of this variety, and a number of paddocks are being planted with it.

South Johnstone.

Industrial conditions in this centre are remarkably good, no friction of any kind having disturbed working operations. The mill is steadily grinding away; large crops and some heavy crushings are reported. For the week ending 9th August, 6,733 tons of cane were treated for a c.c.s. of 13.2.

Generally, the cane was very much cleaner than in previous years, and was arriving at the mill much fresher than last season.

Arrangements were also being made to forward cane from El Arish and Ban Yan to the Invicta Mill at Giru upon completion of the North Coast Line.

Late cut plant and ratoon cane were backward. Young plant cane was not noticed to any great extent, nor had the early cut cane made much progress. Wet weather was the cause of this, for good growing conditions had not been experienced.

Grubs.—Much damage was observed, principally in the vicinity of Japoon, upon No. 3 Branch.

Borers.—Very little damage was noticed this year; one Japoon farmer, upon whose usually very badly infested farm Tachinid flies have been twice liberated by the Bureau of Sugar Experiment Stations, says that it is now hard to find damaged cane.

El Arish Soldiers' Settlement.

A short visit was made to this area, and conditions there were most encouraging. A little township has been established, consisting of two modern stores, a butcher's shop, and Post Office. Fair roads radiate to the several centres of the Settlement.

Some eighty ex-A.I.F. men are now settled there. Many of them are married. Families are housed in compact and neat little houses supplied by the Department, which, to judge by the gardens attached to many of them, are intended to become permanent homes.

To illustrate how the Settlement has grown—In 1922, 6,000 tons of cane were crushed; in 1923, 17,500 tons of cane were crushed; in 1924, 28,000 (estimated tonnage); and as 2,000 acres will be under for 1925 some 40,000 tons should be about the aggregate.

Badila is, of course, the main cane grown, but several growers are trying out E.K.28, M.1900, H.Q.426, Q.116, Sport, and 7R.428 (Pompey). Some growers are inquiring for Q.813 for the poorer classes of land.

Banyan and Tully River.

Good progress is being made in the erection of the mill. A large number of men under the Tramway Engineer are busily engaged in tramway work and bridge building. Numerous business places have already been opened, and a temporary school, with some seventy-eight children upon the roll, show that the place is rapidly forging ahead. A fair area of scrub has been felled this year, but wet weather has so far prevented much burning off. Wet weather has been constant, and it is surprising to see so much work carried out under such unfavourable conditions.

The cane was hardly as good as expected, probably having suffered in its early growth by the dry time then experienced.

Badila is the only cane planted so far, but it is quite likely that growers will be looking for a quicker-growing variety upon some of the poorer classes of soil in the area. Now that the North Coast Line is so near completion it is probable that growers may obtain cane plants from the Herbert River. Before obtaining any such seed, it would be well to remember the warning issued to Herbert River farmers by the Colonial Sugar Refining Company last November, in connection with Clark's Seedling and gumming disease, which was subsequently the means of declaring this variety a disapproved one.

Diseases.—Leaf scald was noticed in Badila in several scattered parts of the South Johnstone area, but so far not enough to cause alarm. Growers, however, are again warned to be very careful in their seed selection, and to use none but the very best of seed from a clean block of cane.

Babinda.

Very wet weather had been experienced in this district, the registrations being as follows:—January, 12.05; February, 13.22; March, 56.79; April, 29.27; May, 21.56; June, 9.58; July, 12.91; August, 5.89; September (up to 12th), 4.88; or a total of 166.13 in. Harvesting conditions were consequently hampered. Despite this handicap the mill was doing remarkably good work in every way, and in general the outlook was most favourable. Crushing was proceeding in a very satisfactory manner, some 79,391 tons of cane having been crushed up to the morning of 12th September. Out of this large tonnage only 60 tons had been burnt.

There were not any large acreages of either early or late young plant cane, nor were the recently cut ratoons as forward as they usually are. According to the mill figures the average density was low, although steadily improving, but some remarkably good densities were noticed from the northern end, numerous samples going over 17 and one 18.3 c.c.s.

Some fine cane was seen upon Bartle Frere, one of the blocks being a 27-acre block of sixteen months' old Badila of Mr. A. Mayer's; close alongside was a very

forward nine months' old crop of first ratoons which would easily cut 40 tons per acre now. This grower has planted in the red soil small blocks of H.Q.458, H.Q.409, Obo Badila, and Tableland Badila. The first two canes have grown well with good stools and length of cane, but would probably show up better proportionately in a poorer class of soil. H.Q.409 is considered a very good cane of high density upon some of the medium to heavy soils on the Herbert River. It is considered a slow striker, though, when planted early. Alongside Mr. Mayer's farm is a 42-acre block of eighth ratoon Badila belonging to Mr. J. Pryce. This should average nearly a 25-ton crop. So far it is under stumps and, of course, has not been manured.

Pests.—Although some damage was caused by grubs in the area it was far less than in previous years, and only in isolated patches. Very little borer affected cane was noted. Growers who formerly suffered severe losses through this pest speak most encouragingly of the good results obtained from the liberation of the Tachinid fly.

Diseases.—Leaf scald was observed in various parts of the area, but more especially in places where its presence had been noticed last year by the writer. N.G.24, N.G.24B, H.Q.426, and N.G.15 are the canes showing the symptoms.

In most cases ratoons show the disease to a far greater extent than the plant crop; second ratoons are also much worse than first ratoons.

In a small block of B.208 leaf scald was observed. Top rot was also noticed in Badila in places.

Manuring.—Growers are reminded that at present the local mill has a very valuable manure in Filter Press Cake. This is a fine manure in any ground, but on heavy, low-lying soil should be of the very greatest value.

Liming.—Several growers whose crops have not been too satisfactory are intending to try either burnt or crushed limestone for next year. As a great proportion of the heavy stiff soils are intensely acid, the result from such liming should be extremely beneficial.

Cane Varieties.—Among the newer varieties giving good results locally Q.813 must now be considered as a quick growing, early cutting, high-density cane. Mr. T. R. Stewart, of Fig-tree Creek, has just finished harvesting 126 tons of twelve months' old plant, giving him an average c.c.s. of 16.2, whilst 40 tons of twelve months' old first ratoons gave him an average of 16.4 c.c.s. This cane was all cut when the mill average was never above 13.5, and the season's average very much lower still. This crop was grown upon medium quality, fairly stiff soil, and had been under cane some ten or twelve years.

Trashing Cane.—In order to try and improve upon the expected low density figures due to such an abnormally wet season, several old and experienced Babinda canegrowers had blocks of plant Badila trashed. After allowing for costs they still are of the opinion that the increased density figures obtained fully justified the expense incurred.

CANE PEST COMBAT AND CONTROL.

Mr. E. Jarvis, Entomologist at Meringa, near Cairns, reports to the Director (Mr. H. T. Easterby) under date 19th September, 1924:—

CALCIUM CYANIDE *versus* CANE GRUBS.

Additional data in connection with the possibilities of hydrocyanic acid gas as a fumigant for our cane grubs has been just obtained (supplementary to that already reported in the "Australian Sugar Journal," vol. XV., p. 708; XVI., pp. 66, 325.

In a previous report it was stated that a dose of 60 grains of calcium cyanide (30 grains on each side of a plant) did not injure young cane shoots from 12 to 18 in. high.

Continuing these field tests, additional injections of from 80 to 200 grains per plant were administered between the dates 25th June to 21st July (6 in. from centre of plants and 6 in. deep), without noticeable effect on cane so treated.

When examining these test plots on 6th September (forty-seven days later) plants that had received 120 and 200 grain doses were found to be quite normal, and appeared to have made better growth on the whole than check plants alongside in the same row.

The above experiments were intended as a crucial test, in order to make absolutely sure this poisonous gas would not damage growing cane roots. Now, in

laboratory experiments made last February against grubs confined in cages of soil, 100 per cent. mortality was obtained from injections of only 15 grains. Assuming, therefore, that in field practice even double this quantity—viz., 30 grains (15 on each side)—should be required to destroy all the grubs under a cane stool, we could still, if needs be, apply more than ten times that amount per stool without risking injury to the cane.

We may gather from results already outlined that this fumigant is well worthy of future study and experimentation as a possible controlling factor against grubs of our grey-back cockchafer.

The cost of treating an acre with calcium cyanide flakes works out at about £2 15s.; which would allow for the injection of 8,580 stools with doses of 30 grains per stool.

FIGHTING THE SUGAR-CANE TERMITES.

The "white-ant" problem on the Burdekin is receiving attention at our laboratory; the activities of the large termite (*Mastotermes darwiniensis*, Frogg.) having caused considerable anxiety of late to several growers at Jarvisfield and elsewhere.

We are experimenting at present along two important lines of control, both of which are yielding encouraging results, and may warrant the carrying out of field tests later on.

The most promising of these is fumigation of the soil with para-dichlor. at planting time, or directly the young cane-shoots make their appearance above ground. Such injections would undoubtedly protect the "sets" from invasion, by rendering the earth surrounding the roots repellant throughout a strip of soil 2 to 3 ft. in width during a period of at least two months. This would enable the stools to become well established and better able to resist attacks that might come later on.

(1) Fumigation with Para-dichlor.

On 26th August an experiment was carried out to determine the effect of para-dichlor. on larval and soldier forms of *Mastotermes darwiniensis* Frogg.

Twelve cages of moist soil, each containing five "white-ants" buried about 3 in. deep alongside a small section of cane-stick were prepared, five of these cages being treated with 1-32 oz. and five with 1-16 oz. doses of crude para-dichlor., while two cages were left untreated, as controls. The fumigant was buried about 2 in. above the termites. Four days later, upon examining three of the cages given 1-32 oz. doses, Mr. F. H. Taylor (Assistant Entomologist) found 25 per cent. of the termites to be in a moribund condition, and the remainder dead. An examination of three cages that had received 1-16 oz. doses showed all termites dead, some being in an advanced state of decomposition. Inspection of the remaining six cages on 2nd September (one week from date of application of fumigant) gave a mortality of 100 per cent. in the treated cages, but no sickness or death occurred in the two control cages.

The above experiment was repeated with very similar results on 9th September, twenty treated and five control cages being used, each containing twenty specimens of the common "white ant" (*Termes meridionalis*). This species was more quickly affected by fumes of para-dichlor. than *Mastotermes darwiniensis*; most of the workers, nymphs, and soldiers of the former ant being found dead forty-eight hours after application of the 1-32 oz. dose.

(2) Dipping "Sets" in Arsenical Solutions.

The two chief arsenicals being tested here at present for controlling white ants are arsenate of copper and lead arsenate. The latter form, although less deadly, has the advantage of being much cheaper, and is not so dangerous to handle. Four strengths of lead arsenate were tested, consisting of from 1 to 4 lb. of the poison in 24 gallons of water.

Short pieces of cane-stick, after being immersed in the various solutions and well shaken about to ensure even wetting of all portions, were first allowed to dry and then placed in cages of soil, each of which contained five specimens of *Termes meridionalis*. The sets were placed 2 in. above bottoms of cages, and the termites 1 in. below these buried pieces of cane.

A couple of cages of the 1 lb. in 24 gallons and two cages of the 2 lb. in 24 gallons were examined after a lapse of four days, when all of the white ants in these cages were found to be dead.

The remaining sixteen cages were opened up after a further interval of four days, with exactly similar results, every termite being dead; while all those in the five control cages were alive and healthy.

The above results indicate that the termites in each cage had worked towards and discovered the sets, and then attempted to eat or tunnel into them.

CANE PESTS OF BURDEKIN DISTRICT.

This district was visited by us last August, in order that control work might be instituted against cane-grubs and other insect pests, which during the past season have done rather serious damage to cane in certain localities. Mr. G. Bates was instructed to proceed to Ayr, and in collaboration with the secretary of the Lower Burdekin Pest Destruction Board, Mr. W. M. Saxby, carry out fumigation work with carbon bisulphide against grubs of the grey-back cockchafer, and at the same time test the effects of this fumigant upon the large white ant, *Mastotermes darwiniensis* Frogg. Grubs were found to have finished feeding, but had not pupated, and were located at depths varying from 4 to 18 in.

Rows of cane, measuring collectively a length of about 10 chains, were fumigated on a farm belonging to Mr. Tapiola, where the soil was of a sandy-loam character. Injections of carbon bisulphide were administered from 12 to 18 in. apart and 9 in. deep, just above the grubs, which had previously been found lying at an average depth of 10 in. from the surface.

Twenty-four hours after application of the fumigant six stools were dug up from where injections had been made at distances of 1 ft. apart, and grubs were found at depths of 6, 8, 13, 12, 10, 12, 12, 7, 10, and 14 in.; all being dead.

Five stools from a row where injections had been made 18 in. apart, yielded grubs at depths of 8, 12, 11, 16, 8, 18, 9, 8, 16, and 14 in., and all were dead.

The ravages of the large white ant were of a serious nature on some of the farms visited. Cane planted in May and during July and August appears to be very subject to attack, and on low-lying alluvial flats this pest was observed damaging both young and old cane. On one 5-acre block of Badila, situated along the bank of a creek cleared in 1913, where termites have been troublesome for the last three years, the proprietor, Mr. Kamp, estimates a loss this season of about 10 tons to the acre. (*Note.*—Growers are referred to heading "Fighting the Sugar-cane Termite," in another portion of the present report.)

Fumigation of termite-infested stools was carried out on the farm of Mr. J. McLean, the bisulphide being applied on each side of some affected rows of cane, while injections of 1 dr. 55 minims were put in 4 in. from the plants, 4 in. deep, and 12 in. apart.

When digging under stools about four hours after application all termites found were dead, but a couple of days later, when digging up treated stools, living termites were found in every case, and no odour of bisulphide could be detected in the soil.

This may have been due to fresh invasion of these stools by termites located outside the fumigated strip, since fumes from carbon bisulphide are not deadly for longer than about twenty-four hours after application in some classes of soil, especially during dry weather when the ground is very open for fumigation.

On the other hand it is possible for many of the white ants to escape the influence of such treatment, owing to failure of the fumes to penetrate into closed tunnels, &c., in the sets or basal portions of stools.

The large moth-borer occurred rather plentifully in young shoots of ratoon and plant cane. Various other insect pests of minor economic importance were observed.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (18th September, 1924) from Mr. W. Cottrell Dormer, who is investigating pests and diseases:—

HERBERT RIVER.

Diseases.

Most of the more important diseases are known to occur in this district, but none have arrested the public attention more than the gumming disease, and, true to report, many sugar-cane fields were found affected. As has been the case with gumming disease in previous epidemics it is that variety which has attained the

highest popularity, which has proven itself most suitable to the infected district, and that has been found the most susceptible to the disease. On this occasion that variety is the well-known Clark's Seedling (H.Q.426). The epidemic is at its worst in the Halifax locality, and in the strip of country lying between the Macknade Mill and the coast near the river. In these parts really serious damage is being done and much cane is actually dying because of the disease. Though the actual damage is not so great in the areas lying about Victoria Mill and east of Ingham—including Gairloch and Ripple Creek—yet the infection is almost as great, as almost every field of Clark's Seedling shows at least the leaf symptoms of gumming disease. Moving in the opposite direction—*i.e.*, west from Ingham—one gradually leaves the main zone of infection until reaching the upper cane lands of the Stone River and the head of Long Pocket, where very little gumming if any at all occurs.

Leaf scald disease, which has at times wrought much damage to sugar-cane in New South Wales, was encountered several times during my inspections. It has been known to occur in this district for a great number of years. However, some of the more recently introduced varieties are proving their weakness under the local condition. This remark would apply especially to Nanemo, Arambo, and Korpi, in order of susceptibility. Close to the Victoria Mill a field containing the three varieties was shown to me as being one of the worst-infected fields of the district. The damage to Nanemo was very serious indeed, and many blank spaces marked spots were one or more stools had succumbed altogether. The remainder of the crops was markedly stunted. The disease was seen also at Halifax, Seymour, and on the Stone River.

A form of control of planting, as rigorous as can be under the circumstances, is being carried out for the Colonial Sugar Refining Company by Mr. K. R. Gard, to whom I am indebted for assistance in the field and otherwise. Mr. Gard is working under the greatest of difficulties as there are a few farmers who persist in planting diseased cane in spite of warning. Such farmers are naturally a menace to an agricultural community which is striving hard to improve its crops.

During my stay at Halifax a combined lecture and practical demonstration on the subject of sugar-cane diseases and insect pests was given conjointly by Mr. K. R. Gard and myself at the invitation of the Halifax Planters' Club. Stress was laid on the infectious nature of gumming and other diseases, and preparations of the gumming bacillus and of the mouth parts of probable disease-carrying insects were made in the presence of the meeting and shown through a high-power microscope. The value of the lecture was very much enhanced by a series of coloured illustrations of cane diseases supplied by Mr. Gard. The meeting was well attended and well appreciated.

Other diseases found doing appreciable damage, especially to Badila, are Top and Root disease. These diseases are fairly widespread throughout the district, but it seems that Long Pocket, where a great deal of Badila is grown, has been the greatest sufferer in this respect.

Insect Pests.

Grubs of the grey-back cockchafer have done serious but not extensive damage in certain localities—Ripple Creek, Gairloch, Seymour, Halifax, Cordelia, Stone River, and Long Pocket. In most cases only small areas have been seriously injured, and in all cases the soil should prove suitable to fumigation with para-dichlor or other fumigants, being for the most part loose and sandy and close to river or creek banks. While following the plough in certain fields I came across several other species of grubs, belonging mostly to the family Anoplognathidæ, and including probably the "Golden Beetles" and "Green Beetles." As all these beetles are collected during the flying season and paid for, the various bodies who have charge of collecting will be pleased to learn the results of the breeding operations being at present made at Meringa, where the Entomologist is studying the economic importance of these several species.

The "Black Set Beetle" (*Pentodond australis*) has been recently noticed doing very slight damage to young cane plants on the Stone River. The "Beetle Borer" and the "Large Moth Borer" were found doing more or less damage throughout the district. To control the former and more important insect, the Colonial Sugar Refining Company have for some time past been liberating Tachinid flies. Our Entomological Laboratory has also at times assisted in this respect. Several species of leaf-hoppers unknown in the Cairns district were observed.

MORETON DISTRICT.

Diseases.

Disease in this district is well marked. Things have not gone so far that they cannot be remedied, but laxity on the part of growers, if continued, will in the course of a few years bring about very severe loss. I am referring especially to gumming disease. Here, as elsewhere, it is the most favoured variety which is most affected—D. 1135. The actual damage is not very serious and in most cases the disease is to be noticed almost exclusively in the leaves of the affected canes. However, the infection is very widespread and extends throughout the Maroochy district, from Coolum to Bridges, Bli Bli, Rosemount, Petrie Creek, and Image Flat, and probably in other parts which I was unable to visit. The extent of cane actually showing gum badly is comparatively small. However, the disease is present in most localities and is merely awaiting suitable weather conditions to break out at its worst and cause very severe loss to growers in sugar content and in tonnage and to millers because of the refractory nature of "gummed juice," and the natural sequence will be a discardance of D. 1135 and perhaps of other valuable canes. Canegrowers of old standing in this district remember a similar occurrence in years gone by. It cannot be too strongly impressed upon the growers as a whole the fallacy of the happy-go-lucky agricultural practices by the many—the "that will do" spirit. Now is the time for the Moreton growers to act and to act quickly. Here is a suggestion:—Whilst in the Moreton district I made known to many growers the peculiar leaf markings which show the presence of gumming disease; wherever I found the disease I remained until I was quite satisfied that the grower could, unaided, detect the disease by these leaf-markings. These growers (who constitute a goodly number) should not only abstain from selling cane to others for planting but each should invite his neighbours to come and be made acquainted with the disease. He could then show them, as I showed him, how to detect the disease. This question should also be discussed at local farmers' meetings and specimens should be brought by growers for demonstration. Having learnt the symptoms, each farmer should discard for planting purposes any field showing the least trace of gumming disease, and before buying cane for plants elsewhere he should personally inspect the standing crop; he should also plough out diseased cane as soon as he is able to afford to do so. Other varieties showing gumming disease are, in order of infection:—Hambledon Seedling (H.Q. 285), Gingila, Malagache, and Q. 813. Although Q. 813 is grown here to a great extent only one field was found which showed gumming disease—a young plant crop adjoining a badly diseased field of D. 1135.

Mosaic disease, known about here as "Leaf Mottle" is also very prevalent, and infections of greater or less extent were found in every district visited. This also is a dangerous disease, causing a great stunting of affected canes and sometimes total loss. Some varieties are, of course, more susceptible to injury from Mosaic than others, but it has been proved in Hawaii, the West Indies, Southern United States, and other great sugar-producing countries, that diseased cane is never able to produce maximum results. Next to Shahjahanpur 10, the variety showing most disease is M. 1900 Seedling; D. 1135 is also more or less infected and the effects of the disease are rather marked in this variety. One case of Leaf Scale disease was noticed where two stools of D. 1135 showed early symptoms.

Insect Pests.

Under this heading there is but little to mention. The most serious insect pests of sugar-cane here are an Anoplognathid grub and the "Black Set Beetle." Both of these bore holes in the freshly planted sets, destroying roots, eyes, and shoots. The worst of the damage takes place where a first crop of cane is planted on land which has up to this time grown Paspalum grass. Both beetles and grubs live on the roots of this grass. When the grass is destroyed they attack whatever is planted in its stead. As the soil is always very loose about affected cane—it being but lately planted—there seems to be no reason why these pests could not be effectively controlled with carbon bisulphide. About 1½ acres per day per man at a cost of £3 10s. per acre or less could be done with a Dank's injector. Only one side of the plant would need to be treated. Distribution of the grubs and beetles in a field could be ascertained by occasionally pulling up a plant here and there. It would be a good plan for local farmers' associations to purchase one or two injectors and a few drums of carbon bisulphide which could be supplied to growers in their emergency.

Grubs have been and are being sent to the Entomologist for purposes of study.

Mole crickets have been known to damage sets in some farms along the Maroochy River. The large moth borer is widely distributed about here, but is doing very little damage.

A UNIVERSAL INDEX TO WOOD.

E. H. F. SWAIN, Director of Forests.

Paper read before the recent Science Congress at Adelaide.

However insignificant a plant, or mighty a tree, the systematic botanist is able to clothe it with an inescapable though often polysyllabic identity. The geologist similarly has conquered his rocky kingdom, and not a pebble on the ground but his quick eye has determined it and recorded it for all time in the geological tomes of the nations. The whistle of the bird upon the tree and the manner of the ant upon the soil have all been recorded and catalogued by avid explorers in science, and scarcely a living or a dead thing does there appear to be left upon the face of the earth that has not been set in its due place in the written inventory of science—except wood.

There are 5,000 woody plants in India, and there are perhaps five times 5,000 species of woody plants upon the face of the globe. The plants themselves are recorded and docketed, but their woods are lost in superficial samenesses. When one contemplates the sameness of bits of wood, it seems scarcely possible to split that sameness into 20,000 odd but constant differences. In sorting out many thousands of pieces of wood one is confronted immediately with a shortage of factors, a seemingly mischievous inclination to variation of even these limited factors, and a greater or less degree of overlapping. Some factors peter out after a few species are dealt with, some factors are evanescent, some factors are specific, some generic, and some merely adventitious. Some wood is perfumed, yet not all people have the same keenness of scent, nor is perfume in wood always a permanent character. Colour is as variable almost as the shade "by the light quivering aspen made," and blackbutt may be yellow or pink. Both karri and jarrah are red hardwoods of the eucalyptus genus, and the controversy as to which is which still rages in Western Australia, the home of both. Annual rings may be fine and crowded, or wide and open, in the same species according to the rate of growth. The same wood may sink or float in water according either to its state of dryness or its condition of density. Yet in different specimens of wood of the same species the specific sameness persists. What, then, constitutes specific sameness?

Composition of Wood.

Wood is composed of bundles of vertical tubes, thatched together with horizontal medullary rays. In porous woods the tubes are hollow, and appear on the transverse section as pores. In coniferous woods the tubes are sealed and the transverse section is non-porous. A survey of the transverse cut really sums up all the major factors of wood. The vessel lines on the longitudinal facies of wood have been adopted as a factor. Importance has been attached to the distribution and arrangement of the pores, the width of the rays on the transverse section and similarly their degree of discernibility to the naked eye, and the visibility of the ray ends on the tangential surface have been employed also. But no definite mode of classification of the woods of the world has so far been announced. In pondering upon the matter over a long period of years, I have gradually brought into focus in my mind the belief that a count of both pores and rays upon a sufficiently wide field of the transverse cut is a virtual summation of all the qualities of porosity and of ray size and distribution.

Upon this belief is founded the system of classification, which I offer as a possibly universal method of indexing woods. I have, of course, had the porous woods most in mind, and provision is left in the system for the inclusion of the non-porous woods, but that important series is not by any means disposed of, and the task is in a large measure relegated to later times, briefly because recourse must be had to microscopic examination. What I style the ray-pore plot is, therefore, the basis of the system. This is an encircled plot on the clean transverse cut, having a diameter of one-fifth of an inch, or five millimetres. Within this circle both the rays and pores are counted carefully with the aid of a hand lens. A surprising count-constancy for both rays and pores was found to exist for the species, although a measure of variability was noticed. But obviously if the count of pores and rays varied greatly, specific sameness would cease, and wood of one species of tree might be transmuted into another species. Red cedar might become white cedar, and bolly gum become maple, and so on. Even so, the transmuted woods would still be rightly grouped. For wood must be known by its characteristics of structure weight and colour, and not by its botanical relationships. Wood, however, does not vary so greatly.

Decimal Filing System.

After many futile attempts to found a system upon classic methods, the discovery of the significance of the ray-pore plot paved the way to the method which is enunciated in this note. The ray-pore plot alone was, however, insufficient. In view of the limitation of factors, and the limitation of range of those factors, it became obvious that any system of identification must be founded upon a method of factor combination and the need for an appropriate vehicle became pressing, as dichotomous vehicles had proven indefinite and bewildering. At this juncture I stumbled upon the decimal filing vehicle. That system has been the cage wherein have been made captive the main factors of wood identification. The decimal filing system has made possible the analysis of wood factors and their sorting out into major, minor, and adventitious, generic, specific, and accidental factors. In the process the factors that really count, the factors of specific sameness, have been isolated and fixed. They are the factors relating to the distribution of the pores and rays and soft tissues, by ringing the changes of combination of these major factors, and by an occasional dash of colour or perfume, Nature has succeeded in producing 20,000 plus different kinds of timber from very few ingredients.

The major factors being isolated, the next thing was to build them into a series of combinations adequate to account for all manner of woods. That a classification of woods could not be devised which was coincident with or parallel to the pseudo-natural botanical system of to-day became established at an early hour. Woods of the same botanical genus differed almost fundamentally in weight, colour, and density, and woods of different genera or even family might be identical in these respects.

The Purpose of Classification.

In any case, the purpose of wood classification was chiefly industrial, and an industrial basis of classification appeared to be requisite. Whilst this industrial basis was adopted for the index, however, the closest approach to a botanical arrangement was sought also, and it may be claimed for the system here set forth that some botanical correspondence of species has been maintained within the limits of the primary commercial arrangement. The completed list provides for some 200,000 different woods, and it will bring fairly well together in their due place in an ascending order of density woods of the same genus and order. The 200 separate species of eucalypts whose woods so much resemble each other as to make it impossible to do otherwise than merely group them into classes, are more or less isolated under the system with some approach to botanical precision, and the problem of the karri and jarrah twins is apparently solved.

Variation Difficulties.

There remains in the woodpile the nigger of variability and similarity. The same nigger, however, pops up also in the herbarium and with similar inconvenience to science. The decimal indexing vehicle affords exceptional facilities for disposing of difficulties of variation and overlapping by the method of cross-referencing, so that a single piece of wood subject to variation may be represented not exclusively by one number, but by several, none of which, however, will be duplicated ordinarily by any other species of wood. Eventually all variations will be tagged under the scheme and fixed. Finally, a list of check tests is available for application in the event of two or more very similar woods, finally coming together.

There are, of course, the difficulties of variation in the observer himself as well as in the material. Some observers are not as precise as others, some have better eyesight than others, and may count more pores and rays. The knife may be blunt or the transverse cut blurred. The index is not fool-proof, but endeavour has been made to accommodate it to an average observer, by not relying upon a precise count of rays, and pores, but by allowing a range of 10 or 20 in the case of rays and 50 plus in the case of pores. Any two moderately careful observers should be able to get within 20 or 30 of each other in the count of pores. If, however, the count approaches the limit of the range, it is cross-referenced to the next decimal.

Indexing Scheme.

A brief description of the universal wood indexing scheme is as follows:—Wood is divided into twenty-four primary groups according to the microscopic features of weight, porosity, and colour. There are four rough and ready grades of weight determinable by what may be styled "sinkability" in water. These are:—(1) Very light soft woods; (2) medium soft woods; (3) medium hard woods; (4) very heavy

hard woods. Each of these four groups is subdivided into three sections according to the decree of porosity discernible on a transverse cut. This subdivision roughly isolates the coniferous group, the boxwood group, and the open-grained group. Colour is employed finally to group woods into two broad classes—namely, pale coloured and deep coloured. This primary grouping of woods is purposely a rough one, on the idea that the schedules of integers and decimals represent a series of sieves, the first of which is very coarse, and seeks only a preliminary sorting out, relying upon the subsequently finer and finer sieves of the series gradually to sort out the woods to the final unit. It provides for a broad trade classification in an ascending gamut of density and weight from very light coarse-fibred woods to very heavy fine-grained woods, thus the higher the number, the heavier the wood; odd numbers represent neutral coloured woods, even numbers deep coloured woods.

Decimal Schedules.

Following upon this preliminary grouping of woods, resort is had to four decimal schedules to further subdivide. The first decimal, by a count of the number of rays intercepted by a 5-millimetre circle upon a transverse cut, ranges the woods of each group in an ascending scale of density. Not only so, but the method has family and generic significance, and proceeds to bring together woods of the same order and genus.

The first decimal arrays the woods more or less precisely into family groups within the primary groups.

The Proteaceæ, Monimiaceæ (*equestifolia*), and Sterculiaceæ (except *Casuarina lepidophicia* and *Casuarina equestifolia*), and Sterculiaceæ (except *Tarrietia*), and several genera of the Monimiaceæ, all come with the 0-10 ray group (decimal ·0). The Clacineæ, Celestrineæ, and the genus *Tarrietia* of the Sterculiaceæ are covered by the 11-20 ray group (decimal ·1), whilst such orders as Tiliaceæ, Hubiacea, and Loganiaceæ, and the genera *Eugenia* and *Rhodamnia* of the Myrtaceæ, all of which have rays of two sizes, are cross-indexed under this decimal from the 60-80 and 80 and other groups. The genera *Daphnandra* and *Doryphora* of the Monimiaceæ also come within this group.

The 21-40 group (decimal ·2) covers the Capparidæ, the Burseraceæ, and the Araliceæ, Apocynaceæ, the Boragineæ, and the Phytolaccaceæ, and most of Celastrineæ. The Meliaceæ are represented only by the Meliæ and the Cedrelæ, otherwise its genera are scattered over all the higher ray groups up to the last, namely, 81 and over, where *Amsera* appears. The *Verbanacone* are represented by the *Omelina*, and the *Laurinede* by the *Cinnamonum* and some of the Cryptocarvæ. The Anonaceæ connect this ray group (decimal ·3), which contains the Solanaceæ and most of the Laurineæ, all the Logumineæ except *Albizzia* and *Pithecolebium*, which extend into the 61-80 group, the genera *Pittosporum*, *Hymensoporum*, and *Bursaria* of the Pittosporeæ, the genera *Evodia*, *Zanthoxylum*, and *Geijera*, of the Rutaceæ, the genera *Flindersia*, *Owenia*, and *Dysoxylon*, of the Maliaceæ, and the genera *Vitex* and *Cleordendron*, of the Verbenaceæ.

In the 61-80 ray group (decimal ·4) the Sapindaceæ and the Hyoporineæ appear, and the Hyrtaceæ are well represented by the genera *Melaleuca*, *Angophora*, *Synerpia*, *Eugenia*, *Tristania*, and *Rhodamnia*. The *Hutaceae* are also represented strongly. So also are the Saxifrageæ.

The final group (decimal ·5) with rays numbering more than 80 per 5 millimetres produced the orders Ebenaceæ and Sapotaceæ, whilst the Myrtaceous genera, *Eucalyptus Xaxthostemon*, and *Backhousia*, occupy a large place within it. The Myoporineæ are represented by *Eremophila*, the Simmarubæ by *Cadellia*, and the Bixieneæ by *Scolopia*.

The second decimal effects a further breaking up of the family groups and genera. The effect is both generic and specific, but, although the decimal has some botanical significance, the septation and arrangement of the pores do not coincide with botanical values. The factors of decimals ·08 and ·09 are possessed only by the Myrtaceæ, principally by the genus *Eucalyptus*, but other individuals of the Myrtaceæ fall also under decimals ·05, ·06, and ·07 in association with the Casuarineæ. Decimals ·03 and ·04 claim the Proteseeæ and a few of the Verbenaceæ. Decimals ·00 and ·01 and ·05, however, sort out and divide up all the other orders.

The third decimal, which relies upon a count of the pores within the 5-millimetre circle, is distinctly specific in effect, and shows a limited variability, which is also specific in character.

The fourth decimal deals with soft tissue, its occurrence and arrangement. It is a factor of botanical significance, and follows the natural orders more closely than

do any of the other preceding decimals. The development of soft tissues is, however, often only partial and uncertain, and it is this indefinition which precludes the earlier application of the factor.

The value of each decimal schedule, however, is not intrinsic, but lies in its capacity for combination with the others, and in the potency of these combinations in reducing the larger groups to smaller groups, and the smaller groups to the unit species. It must never be overlooked, however, that the index factors do not include length, strength, or straightness of the fibres, and woods otherwise similar may be brought into numerical sequence only to be separated again by the check factors relating to fissility or interlockedness and length of fibre. Thus river red gum and grey ironbark happen together because the index factors are practically identical, but red gum is wavy grained, dull, and somewhat brittle, whilst ironbark is straight grained, bright, and elastic. In such cases the burning test is often an effective check factor. Thus, grey gum sparks off without leaving ash, but ironbark leaves a tawny ash. There are a number of such cases, particularly among the eucalypts, of which there are over 200, nearly all single-pored hardwoods.

It would be possible to prepare a fifth decimal schedule relating to the factors of the longitudinal sections of wood, but the four existing schedules leave very few woods to be further subdivided. It would be possible also to incorporate the longitudinal factors in the primary groups, but this scarcely appears to be warranted.

WHEAT CROP PROSPECTS.

Although the recent general rains proved to be somewhat light in some localities, there is every reason to take an optimistic view of this year's prospective wheat yield. Present prospects indicate this should be almost on a parallel with that of the 1919-20 season (3,707,357 bushels), which constituted a record. The average then attained—20.91 bushels per acre—is still well in advance of any similar yields in the Southern wheat-growing States; as a matter of fact, our average wheat yield over a ten-year period is higher than that of the Southern States, exclusive of Tasmania.

The general excellence of this year's crop is undoubtedly due to the good rains experienced during the last ten weeks. In only four districts—Nanango, Dalby, Inglewood, and in the vicinity of Mitchell—was the July rainfall below the average. During August the precipitation was slightly below normal in the Toowoomba, Oakey, and Pittsworth districts, but everywhere else throughout the wheat-growing belt the rainfall both for July and August proved to be well over the average, a circumstance, in conjunction with the beneficial September rains, quite sufficient in itself to engender that spirit of optimism to be met with almost everywhere at the present time.

The general nature of the rains may be gauged from the records taken between 7th July and the present date:—Mitchell 401, Roma 491, Wallumbilla 426, Miles 371, Dalby 309, Jondaryan 308, Toowoomba 488, Pittsworth 498, Cambooya 423, Clifton 335, Pratten 443, Allora 322, Emu Vale 352, Warwick 470, and Goondiwindi 399 points respectively. Other centres registering less than 3 in. for the period under review were Bell 207, Jimbour 248, Oakey 257, Inglewood 264, and Milmerran 275 points respectively.

Obviously, there are factors other than the actual precipitation occurring during the development of a crop which exert an influence on yields. One very marked feature this year is the difference to be observed in the appearance and prospect of crops grown respectively on well worked, fallowed land, and land prepared just prior to the planting season. Those on the well-worked fields bear silent testimony to the benfits derivable both from good cultivation and from having a supply of stored moisture in the subsoil for the crops to draw from.

Observations made by departmental officers in late September indicate that a severe frost on 5th August caused an appreciable amount of damage at the time to crops between such far distant localities as Inglewood and Roma, but vigorous growth induced immediately after from the stool by beneficial rains, soon made up for the temporary check. It is, of course, always possible for rust to exact its toll in the way of a percentage of the average yield, with its corresponding effect on the quality and plumpness of the grain; however, with any sort of luck and granted another fall of rain in the Downs districts to help the late crops, and a freedom from humidity for the next few weeks, wheatgrowers should be able to look forward to good yields, a good quality of grain, and as the world's wheat market is buoyant —to good prices also.—H. C. Quodling, Director of Agriculture.

SEED MAIZE IMPROVEMENT.

By C. McKEON, Maize Specialist and Assistant Instructor in Agriculture.

For a number of years systematic effort has been directed towards the improvement of several strains and varieties of maize, more particularly for Southern and Central Queensland. Excellent yields have been obtained, both in the departmental stud-breeding plots and where the improved stud seed has been grown on privately owned farms, indicating that, when a suitable variety is chosen for a locality and consistent care given to cultivation and seed selection, a new vista of increased returns has been opened up for the grower of this popular crop.

The scheme of seed maize improvement carried on by the Department involves a good deal of highly technical work, and a close study of the botanical characteristics of the maize plant.

Few cereals are more readily susceptible to cross-fertilisation than maize, and for this reason deterioration in type, quality, and yield are inevitable unless some well-organised scheme of improvement be adopted by growers. Evidence is not wanting of the excellent influence exerted in certain localities towards the establishment of a good class of grain by the effort of often one grower who specialises in seed maize, and selects a type to suit conditions existing in his own locality or district. Obviously, however, standard types of grain will not readily be obtained by a number of growers working independently of each other.

Recognition must be given to the zeal of the individual who sets up a standard in the matter of a grain type, and works consistently year by year to maintain it. There is, however, a limit to the scope of independent work of this description. Localised effort, if sound in principle, must also be sound in practice. As soil and environment naturally play their part in evolving plant and grain types, it follows that "place effect," in so far as it applies to seed maize selection for the State as a whole, is a matter which can only be effectively dealt with by establishing and working to fixed standards for improvement, based on scientific principles. This, briefly, is one of the reasons for setting up a departmental organisation to improve the type and productivity of Queensland-grown maize. In this latter connection, results justify an optimistic view being taken of the effect of the policy adopted of establishing pure types of seed, testing out individual ears therefrom to ascertain the relative productivity of each, and then propagating from the proved high-producing strains to ultimately provide bulk seed for sale to farmers.

Effort has been directed throughout to co-operate with individual growers in different districts, so that the farm on which seed improvement work is being carried on by the Department may be made the centre from which supplies of a particular class or variety of grain may be distributed. Observation goes to prove that the system outlined is gradually having the desired effect. Touching the question of high productivity and the improvement to be looked for by the establishment of seed maize of known capacity to give a good yield when conditions are favourable, certain cases are cited to show that the average yield of the State leaves much to be desired, as the average for the ten-year period ending 1922 was only 21 bushels per acre. One farmer in the Mary Valley threshed 117 bushels per acre of Improved Yellow Dent from an 8-acre field, and stated that by the employment of departmental seed he increased the average yield on his farm by 40 bushels per acre. Another grower, in the same district, threshed 116 bushels per acre of Reid's Yellow Dent from a 6-acre plot—a remarkably high yield for a four-months variety.

Again, at Kilcoy, where Golden Beauty, a five-months corn, appears to suit local conditions, a yield of 93 bushels per acre was harvested from a 4-acre field.

Star Leaming, on which careful selection work has shown a marked improvement, is another four-months variety which does well both in the coastal and intercoastal districts. When sown to allow for the tasselling period to synchronise with the wet season, it has proved itself to be a most consistent yielder, returns of upwards of 80 bushels per acre being not uncommon.

Good results have also been obtained with Funk's Yellow Dent, another four-months corn; up to 70 bushels per acre being harvested.

Funk's 90-Day, a dent corn, possessing a small, bright, hard-textured, attractive grain, has been much sought after by growers wishing to take advantage of a short growing season. For a 90-day type (it actually takes 110 days to thoroughly ripen to fit it for threshing direct from the field), it has shown itself to be a consistently high producer; up to the present the best return under field conditions being 69 bushels per acre—admittedly a big return for an early maturing variety. Ample evidence is forthcoming of the improvement in the type of grain met with at district shows and in the market, also in the yields obtained by individual growers who have been using departmental seed. To maintain this improvement steps are taken each year to raise sufficient pure seed to sow several thousand acres of maize, thus giving a direct and practical application to the scientific system of seed improvement undertaken.

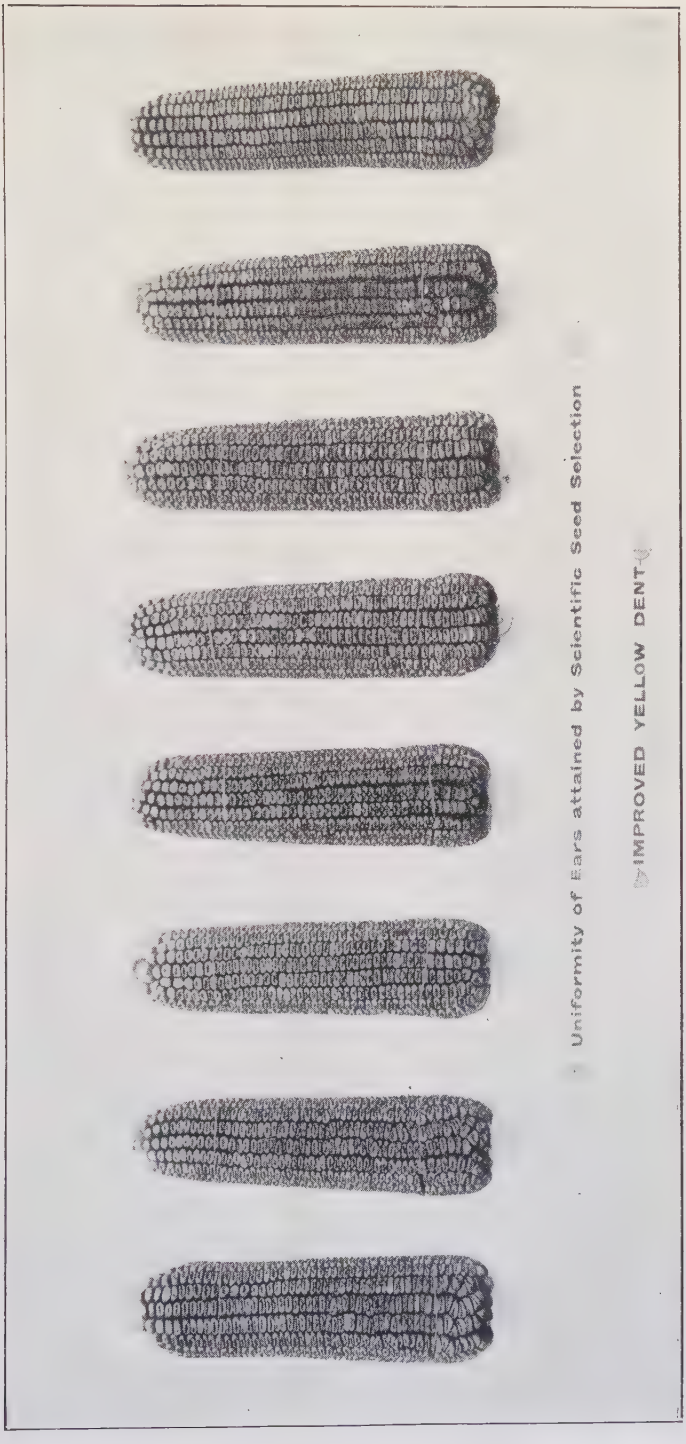

Uniformity of Ears attained by Scientific Seed Selection
IMPROVED YELLOW DENT

Plate 84.

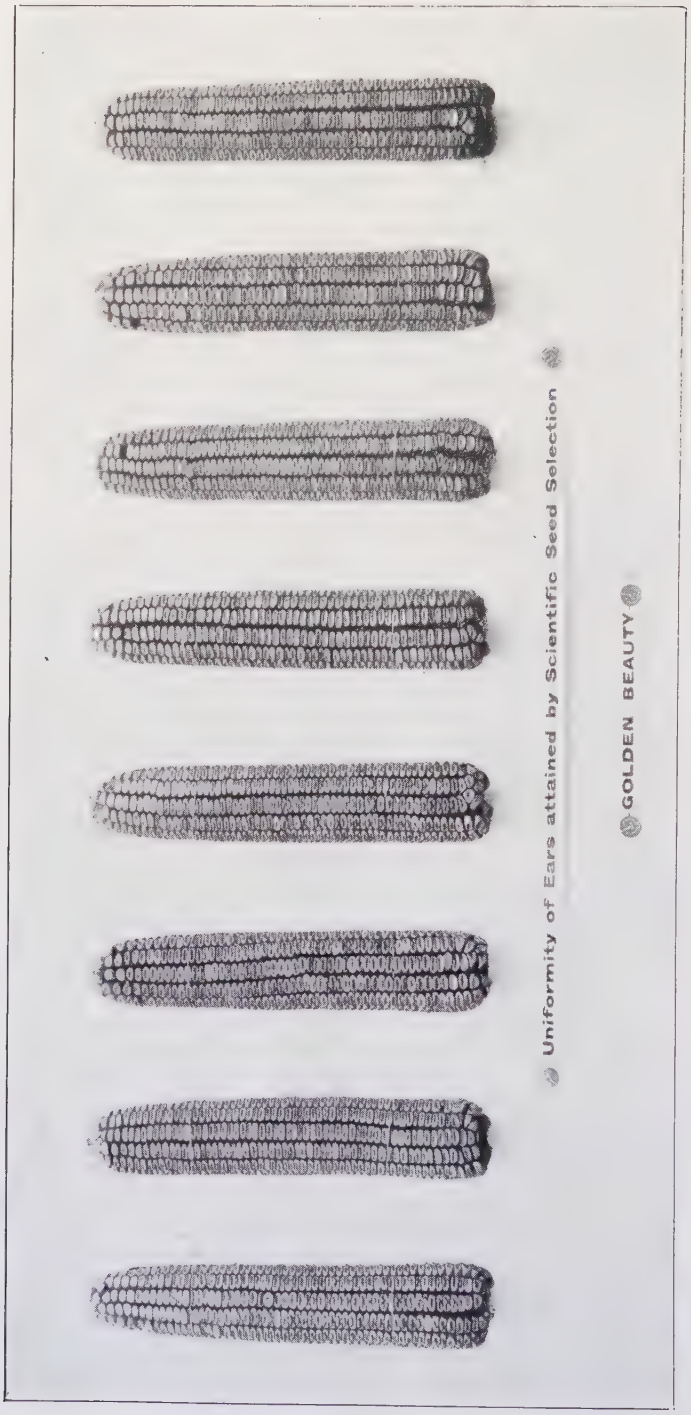

Uniformity of Ears attained by Scientific Seed Selection
GOLDEN BEAUTY

Plate 85.

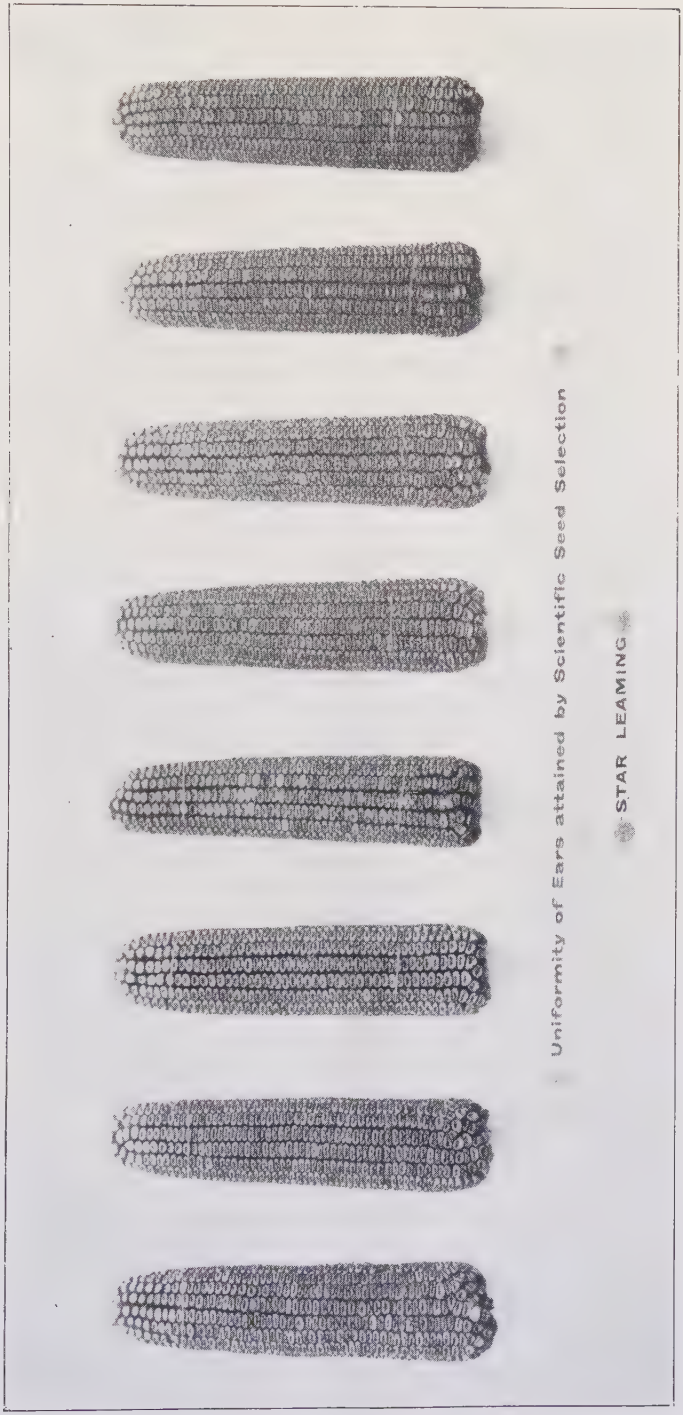

Uniformity of Ears attained by Scientific Seed Selection
STAR LEAMING

Plate 86.

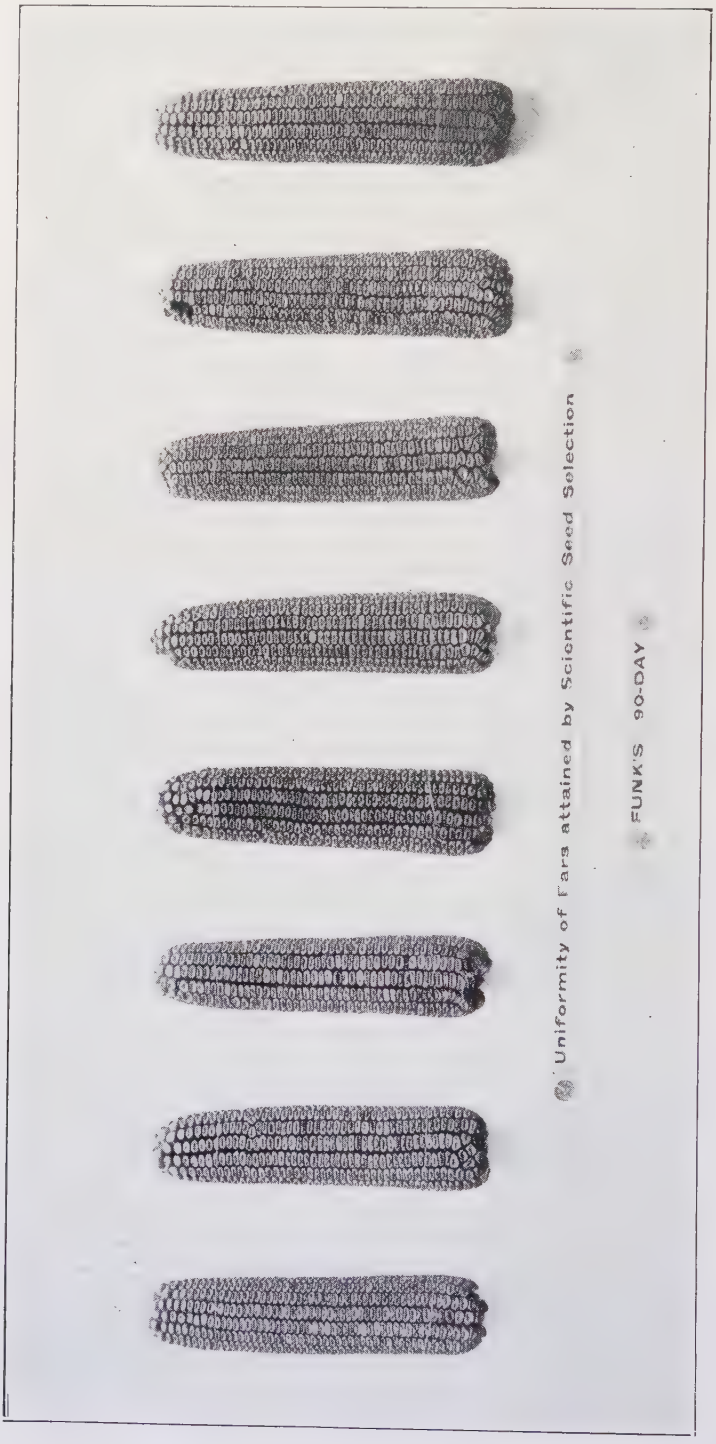

Uniformity of Ears attained by Scientific Seed Selection
FUNK'S 90-DAY

Plate 87.

OUR FEATHERED FRIENDS.

BIRDS IN RELATION TO AGRICULTURE.

By J. R. KINGHORN, C.M.Z.S.*

That birds are one of man's most valuable and yet least valued possessions is a fact which is recognised by the comparatively few people who study them. Man generally considers himself to be the lord of the earth, but in this he certainly makes a very big mistake, for insects are the dominant power. Whilst a number are beneficial, many are carriers of diseases which affect him either directly or through his products, and as others destroy his works, it will be realised that they are his greatest enemy. There are many scientists who are working untiringly in an endeavour to find some reliable mechanical or chemical insect exterminator; but, while we wait for such an invention to be perfected, we are apt to overlook the fact that certain species of birds will do the work thoroughly if we give them the chance by encouraging them.

Birds, because of their insectivorous diet, form the greatest army that Nature can muster in her endeavour to keep insects from becoming plagues. At times, when the balance of Nature is temporarily upset, insect plagues may eventuate, and then birds and man become allies in the great fight against them. Unfortunately, man soon forgets the work the birds have done for him, and he fails to give them the protection necessary for their welfare and his own.

Economic Value of Native Birds.

Australia is blessed with over 800 species of birds, and only about thirty or forty might be considered to be in some way or other destructive; nevertheless, I would like to add that all of our birds have some economic value. Among our smaller and better known feathered friends are willy wagtails, blue wrens, tomtits, jacky winters, yellow robins, wood swallows, and thickheads, the latter are sometimes known in the western districts of New South Wales as thrushes. All these are most valuable in the garden, the orchard, or the open forest, where they wage continual war on the smaller insects, many of which are highly destructive to man.

The quail is one of our game birds, and, therefore, a reserve food supply, but it is also a great weed and insect destroyer, and, contrary to popular ideas, grain is seldom eaten by them. In California it has been estimated, on examination of stomach contents, that one quail eats half an ounce of seed and half an ounce of insect diet per day; this does not sound very much, but it means that 100 quail in any district would destroy nearly 600 lb. of insects and 600 lb. of weed seeds during the open season, say March to July. In Australia, there is much controversy as to what constitutes the food of the stubble quail; zoologists and the more reliable observers assert that it eats insects and weed seed, and very occasionally fallen grain; while many sportsmen and shooters declare that it is destructive, and eats more grain than seed, with an occasional insect, the latter more by accident than by choice. We must remember that quail are ground birds and can eat only fallen grain, during or after harvesting—a very short season indeed. The rest of the year it must find other food. I have lately examined the stomachs of over twenty stubble quail from grass, lucerne, and stubble land, and found that the crops and stomachs contained grasshoppers, other insects, weed and thistle seed with an occasional grass seed—and, to my astonishment, no grain whatever.

The blue crane is a destroyer of grasshoppers and crayfish (yabbies), which have the habit of boring into the banks of irrigation canals; and ducks are of value because of the great number of water insects which they eat, among which are millions of mosquito larvæ.

Rosellas and white cockatoos are known to be highly destructive, yet even these birds can do some good when they turn their attention to weed and thistle seeds. The black cockatoo, on the other hand, having an entirely insectivorous diet, is most useful in the forest areas, where it wages war on the many beetles and borers which would otherwise destroy most of our timber.

The peewee and magpie are two of the most valuable ground feeding birds we have, and they are a great asset to the farmer, inasmuch as they have a special liking for wire-worms and cut worms, which, if left alone, would multiply to such enormous numbers that crops would be absolutely destroyed, and even grass or weeds would not be able to grow.

* In the "Australian Museum Magazine."

The silver-eye is insectivorous as well as frugivorous. There is no doubt that it plays havoc with fruit, but, during the season when fruit is not available, it lives entirely upon insects. It is really a valuable bird in the garden, field, and forest, where it destroys myriads of aphids, scale, and other such pests; but in fruit districts it is valuable only during the season when the bloom is on the trees. The cuckoos and cuckoo shrikes are entirely insectivorous, and therefore deserve full protection for the valuable services they render.

Starlings and sparrows are noted for the damage they do in this country. They not only destroy fruit and grain, but drive away many of our useful insectivorous birds. Individually both birds have many good points, especially the starling, as it often turns its attention to root worms, and it is only when it moves about in large flocks that it becomes destructive. Swallows have been described as the light cavalry of the bird army, but I should prefer to call them the air force. They work continually from dawn to dark, ever on the move, missing no opportunity to destroy insect enemies which have been driven out of the scrub lands by other birds. They are the natural enemy of the weevil, and should be encouraged to live about the farm in large numbers.

Crows and ravens, although undoubtedly destructive in sheep country, have much to be said in their favour. They are great scavengers, being carrion eaters, and therefore destroy possible breeding grounds for that enemy of the sheep-man, the blowfly. They do both harm and good, and should not be killed through prejudice, but should be carefully observed and protected or destroyed as necessary in the districts in which they abound.

The Call for Bird Protection.

The same remarks might apply to the hawks and eagles. Because one may steal a chicken once or twice in its lifetime, the whole family is forever condemned. The natural food of hawks comprises rats, mice, young rabbits, and birds; seldom do they attack man's property, yet they are continually persecuted. Some friends of mine informed me that they had shot 200 eagles on their property in a year because they carried off fowls and lambs. I pointed out that one fowl was a small feed for one eagle, and that it would take well over 30,000 fowls or 5,000 lambs to feed 200 hundred eagles for a year; but, as only a comparatively few lambs and fowls had disappeared, the eagles must have been playing havoc with the rabbits and hares. Eagles live and thrive in mountainous districts where fowls and lambs are quite unknown, and they should receive the same consideration as crows and ravens, though it must be admitted that they are far worse than hawks, many of which are highly beneficial. A leading American biologist has said that "the people who are only too ready to cry out for the destruction of these valuable birds should be the first to ask for their protection."

While most birds work by day, there are also many which hunt at night, foremost among them being the owls, a family comprising many species, all of which are very destructive to mice, which would otherwise overrun the fields. An Australian zoologist, Mr. A. M. Lea, carried out some investigations relating to the food of the barn owl. He estimated that two pellets were thrown up each day, equalling 730 per year; he therefore examined 730 pellets from one locality and found that they contained remains of 1,407 mice, 143 rats, 5 rabbits, 375 sparrows, 23 starlings, 25 other birds, 4 lizards, 174 frogs, 23 night moths, 50 crickets, and 29 other insects. This will afford the reader some idea as to the value of these birds.

The podargus, or frogmouth (perhaps more generally known as the morepork), is insectivorous, and, being a nocturnal bird, it carries on the work started in the daytime by the diurnal birds, mainly against cicadas and night-flying moths.

Wood swallows or blue martins, by reason of their gregarious habits, are highly useful in helping to check plagues. I recollect a plague of caterpillars which visited Bathurst about 1903, attracting thousands of wood swallows, which quickly checked it. As a caterpillar eats about twice its weight in food per day, an army of them would in a short time destroy hundreds, or even thousands, of acres of grass lands and vegetable gardens.

It is at such times that Nature kindly takes a hand and sends the birds to our aid, but we are often only too ready to sit back and let "our feathered friends" do all the work. In respect to the protection of birds, I might say that we owe the main features of our Birds and Animals Protection Act to scientists and naturalists who knew the great value of our fauna, and it was passed by the Government in the interests of the country. Unfortunately—and mainly through ignorance—many people do not respect the clauses of the Act. Birds are ruthlessly slaughtered, their eggs collected, and their breeding interfered with. If half the energy that is expended

in collecting the eggs of protected birds were devoted to collecting the eggs of sparrows and starlings, it should only be a matter of a few seasons before a very appreciable reduction in the numbers of these pests would result and incalculable benefit to the country would follow.

Children who want to study Nature spoil their efforts and good intention by collecting eggs. The notebook and the camera are not only the most interesting but the most instructive and useful articles through which a full insight into the life and habits of birds can be gained.

Nature's Delicate Balance.

We must remember that Nature is wonderfully and delicately balanced. If we reduce her numbers in one direction, the inevitable result will be increased multiplication in another. Thus if we continue to destroy our valuable insect-eating birds, we must be prepared to bear the brunt of attacks of hordes of insect pests, with disastrous results to ourselves. We must not allow ourselves to be carried away by sentiment or prejudice, but must be guided by facts which are the result of scientific investigation.

Birds a National Asset.

We have no right to act selfishly in faunal matters, as the fauna does not belong to us individually or collectively; it belongs to the country. Our Australian birds are both beautiful and useful. They are the greatest national assets which our country possesses, a fact which is only too often overlooked. Birds and other animals are here for our enjoyment and use, but we are apt to forget that we hold them in trust, and should consider them a heritage to be handed down to future generations. If some people persist in destroying as they do now, our fauna is doomed to extinction, and there will come a day when many of our most valuable species will be exterminated. Then our folly will rebound with terrific force, having such terrible results as may end in widespread disaster. The agriculturist and other primary producers would find their work impossible without the aid of birds; so let us protect and encourage them; they are our true friends and allies.

"RUST SCAB" OR "RUST" IN BANANAS.

In the couse of a recent reply to a correspondent on the subject of the disease or defect of the banana fruit known as "Rust Scab" or "Rust," the Government Entomologist, Mr. Henry Tryon, made the following observations:—

"It is a banana affection that, for the last twenty years or more, has been observed in banana plantations from Cairns—and beyond—in the north to the Northern Rivers of New South Wales, but by no means generally so.

"Dr. W. A. Cobb, the former well-known Pathologist of New South Wales, fully treats of it in one of his 'Letters on the Diseases of Plants,' second series, 'Agricultural Gazette,' New South Wales, XIV., 3rd August, p. 683-691, 1904. However, he concluded that it was occasioned by a parasitic fungus, not of the nature of any Rust fungus (*Puccinia*) but by one having some of the characters of a yeast organism. He termed the disease 'Banana Scab.' His material, furnished by Cairns, was fruit forwarded to Sydney therefrom.

"About the same time the present writer, on conducting researches into banana troubles in this district, and Cairns also, concluded that Cobbs's 'Banana Scab' was of quite a different origin and due to a minute almost invisibly small insect, one of the 'Thrips tribe'—a species of Euthrips, and this finding has been accepted by all subsequent inquirers, including Mr. Benson.

"The insect occurs upon the plant in three distinct forms:—(1) The egg, (2) wingless larvæ—of three or more stages of growth, and (3) winged insects—both male and female. As in the case of the majority of other kinds of Thrips their wings are narrow, long, and fringed ('Fringe Wings' or 'Thysanoptera').

"The injurious relationship to the plant—the banana that it affects—arises from two features that are very important to bear in mind.

"One of these consists in the fact that in feeding it probes the cuticle or skin of the banana (any part of the plant and not the fruit only) with its sharp lance-like mouth-organs and thus absorbs the sap, and probably also it gives rise to chemical changes. Hence it cannot be poisoned—say by the use of any arsenical preparation.

"The other feature is that of inserting its eggs, here and there singly just under the cuticle or skin, also cutting for this purpose a minute slit by aid of two saw-edged plates that, arising towards the extremity of the hind body beneath, are, when at rest, unsheathed in a grove, that occurs here directed backwards.

"There are, however, other habits displayed by this Rust Thrips insect that the banana-grower cannot afford to ignore.

"(1) It is very necessary for him to bear always in mind that this tiny insect causing the trouble is, when occurring, present on the plant, before this is indicated by any outward symptoms whatsoever.

"The Rust, so called, is an after effect of injury—first the skin being darkened by chemical change, wherever pricks or slits have been made in egg-laying or feeding, and local death of the epidermis following this, fissuring of the surface taking place, since this cannot expand in correspondence with the plant's growth. It follows from this, that whatever procedures be adopted for controlling the insect, and so preventing its injuries, they must be resorted to earlier than when these signs of the trouble become manifest or manifest to any extent.

"(2) Also that it is present on the plant generally and not on the fruit only, and that therefore as long as any tender skin in the immature fruit is present, it is liable to attack, notwithstanding that the Thrips insects formerly present on the bunch have been killed by some application or another. It may 'come again,' in fact under these circumstances, as banana-growers often have remarked.

"(3) This renewed attack may be derived from eggs inserted singly in the surface tissue of the plant, and that owing to a protective covering of a gum-like nature, that fills the mouth of the egg slits, are almost invulnerable.

"(4) Or it may be due to insects deeply concealed with 'peepers,' within 'suckers,' or within folded 'sword leaves,' or beneath 'leaf sheaths,' as well as in other crannies in the later growths.

"The minute size of the insect favours its habits of entering within these narrow and confined spaces between one part of the plant and another, and when once living in such situations, insecticides can scarcely be forced into them to kill them.

"(5) It must be again borne in mind that both adult male and female insects, as we have already stated, are ultimately winged, and so may pass from plant to plant in flight through the air.

"(6) Again, the intimate relation between the plant and insect, above alluded to, lends itself to the insect's ready conveyance by suckers delivered from infested areas.

"Two noteworthy instances of this have come under my notice. In one case after I had called attention to the imminent risk of introducing the pest by drawing supplies of suckers from a rust-affected district, a grower in a clean area (remote), to whom my warning came too late, thus wholly infested a plantation of 8 acres.

Remedies.

"Various remedial procedures—principally as the outcome of Mr. A. H. Benson's advocacy—and lately so, the use that Pyrethrum and wood ashes have been prosecuted elsewhere for controlling the Rust Thrips and Rust disease. Indeed, he has cited successful experience in dealing with it where referred to, by means of this mixture, applied by a special method that he describes. This I need not enlarge upon since he has told you all through the Press, 'The experience of Fiji,' also Samoa, where the disease is prevalent, is that the powder so applied destroys the 'Thrips'—he states. I have not been fortunate enough to have seen any account of its use for the purpose in these countries, nor am I aware of any evidence derived from well conceived field tests as to its efficiency in controlling the insect's occurrence and the injury for which it is responsible generally. My colleague, however, speaks with special authority and should be better informed.

"*But I still consider that the need for properly designed and properly carried out experimental inquiry is existent.*

"Other contact insecticides, besides Pyrethum, might be mentioned, but we have not the exact data to recommend resort to them.

"Possibly local inquiry—unfortunately, my ill health will not admit of my personally conducting it—might establish the fact (let us hope so), that the occurrence of Banana Rust or Rust Scab is—in the fertile Gympie area—quite local and circumscribed.

"If it be the case, it might be expedient to consider whether it might not be worth while to eradicate and burn the affected plants—winter favours the effectual carrying out of this procedure—providing a sum of money to compensate those immediately effected by this drastic action."

MOUNT GRAVATT EGG-LAYING COMPETITION.

REPORT FOR MONTH OF SEPTEMBER.

During the past month 5,802 eggs were laid, equalling an average of 21·49 eggs per bird. This shows a slight falling off from August laying, which would be accounted for by the changeable weather and broody hens. Mr. Hutton's B bird has made an unbroken sequence of 64 eggs.

The weighing of the eggs has been completed, and the scores marked U are those of pens which failed to obtain the average of 24 oz. to the dozen.

The following are the individual records:—

SECTION 1.

LIGHT BREEDS.

Name.	Breed.	A.	B.	C.	D.	E.	F.	Total for Month.	Grand Total.
D. and G. D. Hindes	White Leghorns	130	136	124	133	131	116	154	770U
D. H. Flowers	Do.	86	100	130	119	135	130	140	700U
Oakleigh P. Farm	Do.	103	129	109	107	123	123	130	694
H. Fraser	Do.	120	111	107	134	101	108	142	690
John J. McLachlan	Do.	49	125	129	95	110	81	129	687
S. Grenier	Do.	97	103	127	112	108	113	144	672
H. T. Britten	Do.	123	127	87	105	46	105	121	671U
Mrs. L. Anderson	Do.	115	108	115	106	110	114	138	668U
T. H. Craig	Do.	106	110	106	120	83	130	152	655
J. E. G. Purnell	Do.	107	95	103	113	116	121	128	655
R. C. J. Turner	Do.	122	121	91	113	81	127	147	655
Kidd Bros.	Do.	122	129	74	119	103	105	132	652
T. D. Honeywill	Do.	111	128	100	103	115	88	134	645
Mrs. R. E. Hodge	Do.	120	115	87	120	105	97	128	644
G. D. Cox	Do.	108	86	123	80	133	110	143	640
A. A. Stirling	Anconas	100	109	125	111	84	105	108	634U
G. Marks	White Leghorns	136	100	100	90	100	102	148	628
W. D. Melrose	Do.	72	112	133	120	85	88	96	628U
W. Wakefield	Do.	43	116	117	99	115	130	148	620
A. Neil	Do.	119	111	106	113	58	95	123	602U
L. G. Selman	Do.	115	112	103	87	98	80	128	595
T. W. Biddulph	Do.	125	114	60	100	77	96	109	572
B. Driver	Do.	90	79	74	128	109	89	138	569
H. P. Clarke	Do.	85	85	98	109	99	80	120	554
W. McHardie	Anconas	98	92	77	96	94	93	124	550
J. D. Newton	White Leghorns	102	87	84	81	102	91	133	547
Chris. A. Goos	Do.	5	125	90	101	110	106	85	537U
Geo. Williams	Do.	104	40	95	94	94	82	120	509
L. Bird	Do.	116	122	107	59	120	110	120	634U
Ancona Club (Pen 2)	Do.	89	88	54	63	80	73	97	447
Ancona Club (Pen 1)	Do.	60	89	85	108	64	17	73	423

SECTION 2.

HEAVY BREEDS.

James Hutton	Black Orpingtons	124	153	132	110	122	124	156	765
J. Potter	Do.	126	137	110	102	134	101	143	710U
E. Walters	Do.	64	79	96	145	151	112	138	652
D. and G. W. Hindes	Do.	95	89	107	109	136	94	114	630U
R. Burns	Do.	110	100	102	101	91	103	149	607
Kidd Bros.	Do.	98	81	105	105	123	90	134	602
Mrs. A. E. Gallagher	Do.	84	121	101	93	97	93	152	589
F. W. Lenny	Do.	114	67	121	74	70	106	122	552U
H. G. Stevens	Do.	94	104	82	92	80	98	148	550
Mrs. A. Kent	Do.	106	123	65	73	69	98	133	534
H. M. Challie	Do.	86	99	105	86	122	34	105	532U
J. Ferguson	Do.	42	85	110	99	84	98	119	518
E. C. Stead	Wyandottes	41	109	53	79	55	80	142	423U
Carinya Poultry Farm	Black Orpingtons	103	82	122	113	108	122	133	650U

P. RUMBALL, Supervisor.

N.U.P.B.A., TOOWOOMBA SUB-BRANCH.

Single Test Egg-laying Competition—Scores to 31st August, 1924.

Black Orpingtons.

Pen No.	Name.	Weight of Eggs.	Total for Month.	Total to Date.
2	Hutton, J.	2.10	22	122
11	Webb, A. W.	2.30	26	117
52	Holmes, R.	2.16	21	117
9	Everlay P. Farm	2.22	26	116
29	Adams, W. S.	1.83	15	113
28	Williams, W. D.	2.21	21	111
51	Holmes, R.	1.95	22	111
45	Stephens, H. B.	2.16	27	110
24	Carr, T. J.	1.77	24	110
22	Walsh, H.	1.96	26	110
33	Potter, J.	2.02	24	109
42	Wilson, W. K.	2.01	23	108
7	Adams, P. F.	1.68	29	106
20	Maund, Mrs. L.	2.11	24	106
23	Carr, T. J.	2.07	25	106
42	Wilson, W. R.	2.01	23	108
5	Walters, E.	2.21	24	101
49	Ollier, T. C.	1.70	22	101
15	Macfarlane, K.	2.18	26	100
40	Rodgers, G. E.	2.16	22	100
32	Radford, G.	2.00	22	96
3	McLay, J. A.	2.26	23	95
10	Everlay P. Farm	2.22	26	95
43	Smith, E. R.	2.21	22	95
39	Rodgers, G. E.	2.18	23	93
50	Ollier, T. C.	2.00	27	91
13	Burns, R.	2.05	28	90
31	Radford, G.	1.96	15	90
19	Maund, Mrs. L.	2.03	23	88
6	Walters, E.	2.26	24	86
25	Stephens, Moss	2.03	26	86
1	Hutton, J.	2.16	12	83
44	Smith, E. R.	2.33	24	83
27	Williams, W. D.	2.13	20	82
30	Adams, W. S.	2.07	27	81
36	Rivett, R. R.	2.20	21	80
21	Walsh, H.	2.17	12	79
37	Short, J. W.	2.02	18	77
48	Head, J.	2.03	24	70
16	Macfarlane, K.	1.77	22	65
14	Burns, R.	2.03	21	62
46	Stephens, H. B.	2.42	20	61
47	Head, J.	1.80	24	61
34	Potter, J.	1.67	22	59
35	Rivett, R. R.	2.00	14	53
4	McLay, J. A.	2.11	16	51
8	Adams, P. F.	2.07	26	50
38	Short, J. W.	1.97	28	49
26	Stephens, Moss	2.37	21	47
17	Champion, S. H. K.	1.94	6	39
18	Do.	2.02	22	39
12	Webb, A. W.	—	—	16

Other Varieties.

60	Le Pla, A. W. (R. I. Reds)	2.02	26	118
70	Dibbs, H. (Langshans)	1.96	25	113
59	Le Pla, A. W. (R. I. Reds)	2.08	19	109
53	Warrian, C. G. (Rock.)	1.98	25	108
66	Becker, W. (Langshans)	1.57	27	107
57	Maund, Mrs. L. (Col W'dotte)	1.88	25	97
65	Becker, W. (Langshans)	1.84	24	90
61	Harrington, J. (B. Leghorns)	2.00	17	88

OTHER VARIETIES—*continued.*

Pen No.	Name.	Weight of Eggs.	Total for Month.	Total to Date.
56	Carr, T. J. (S. W'dottes) ..	1.75 ..	18 ..	83
69	Dibbs, H. (Langshans)	2.17 ..	17 ..	80
68	Everlay P. Farm (B. Leghorns) ..	1.85 ..	22 ..	79
71	Brand, V. (R. I. Reds)	2.10 ..	17 ..	73
64	Rafter, J. J. (B. Leghorns) ..	2.06 ..	18 ..	71
54	Warrian, C. G. (Rock.)	2.17 ..	25 ..	70
58	Maund, Mrs. L. (Col. W'dotte) ..	2.00 ..	18 ..	48
55	Carr, T. J. (S. W'dotte) ..	1.98 ..	25 ..	44
63	Rafter, J. J. (B. Leghorn) ..	2.01 ..	16 ..	42
62	Harrington, J. (B. Leghorn) ..	1.75 ..	12 ..	41
72	Brand, V. (R. I. Red)	2.33 ..	20 ..	41
67	Everlay P. Farm (B. Leghorn) ..	2.20 ..	20 ..	27

WHITE LEGHORNS.

132	Short, J. W.	1.74 ..	26 ..	129
112	Chapman, S.	1.87 ..	22 ..	117
114	Cole, R. C.	2.30 ..	27 ..	116
131	Short, J. W.	1.87 ..	25 ..	116
105	Hutton, J.	2.05 ..	21 ..	115
78	Howard, R. B.	2.31 ..	27 ..	113
74	Dippel, D. H.	2.10 ..	21 ..	108
110	Emoh Pens	1.89 ..	24 ..	108
124	King, J. E.	2.12 ..	23 ..	108
73	Dippel, D. H.	2.15 ..	23 ..	105
121	Grant, W.	2.00 ..	23 ..	104
106	Hutton, J.	1.85 ..	25 ..	103
111	Chapman, S.	2.11 ..	20 ..	103
91	Stilton, G.	2.06 ..	22 ..	102
122	Grant, W.	2.20 ..	25 ..	102
129	Manning, H. G.	2.17 ..	21 ..	99
123	King, J. E.	2.27 ..	25 ..	98
93	Williams, D. W.	2.00 ..	22 ..	97
103	Fallon, P. J.	1.70 ..	23 ..	93
100	Newton, J. W.	1.89 ..	21 ..	92
118	Goggins, J.	1.98 ..	25 ..	92
115	Taylor, J.	2.31 ..	10 ..	91
113	Cole, R. C.	1.97 ..	21 ..	90
75	Wilson, W.	2.22 ..	21 ..	89
88	Warrian, C. G.	1.87 ..	27 ..	89
109	Emoh Pens	1.92 ..	23 ..	88
101	Turner, R. C. J.	2.22 ..	10 ..	87
108	Adams, P. F.	2.30 ..	20 ..	87
125	Maurer, G.	1.90 ..	25 ..	87
77	Howard, R. B.	2.36 ..	20 ..	86
97	Hunt, G.	2.18 ..	24 ..	84
87	Warrian, C. G.	2.01 ..	23 ..	83
95	Adams, W. S.	2.08 ..	22 ..	83
99	Newton, J. W.	1.91 ..	20 ..	83
117	Goggins, J.	2.08 ..	23 ..	83
85	Rivett, R. R.	2.43 ..	27 ..	82
128	Stilton, E. J.	2.00 ..	22 ..	82
104	Fallon, P. J.	1.83 ..	16 ..	81
86	Rivett, R. R.	2.10 ..	22 ..	80
96	Adams, W. S.	2.08 ..	23 ..	80
116	Taylor, J.	2.12 ..	8 ..	79
76	Wilson, W.	2.16 ..	22 ..	78
81	Smith, E. R.	2.12 ..	24 ..	72
127	Stilton, E. J.	2.07 ..	18 ..	72
107	Adams, P. F.	2.18 ..	22 ..	71
80	McBean, S.	2.09 ..	21 ..	71
120	Rogers, G. E.	2.27 ..	24 ..	69
102	Turner, R. C. J.	2.04 ..	— ..	68
126	Maurer, G.	1.99 ..	23 ..	67
130	Manning, H. G.	1.76 ..	24 ..	67
83	Carinya P. Farm	2.00 ..	20 ..	66
90	Ellis, L. E.	2.04 ..	18 ..	66

WHITE LEGHORNS—*continued.*

Pen No.	Name.	Weight of Eggs.	Total for Month.	Total to Date.
92	Stilton, G.	2.10	16	66
79	McBean, S.	1.93	24	64
84	Carinya P. Farm	2.04	22	63
119	Rogers, G. E.	1.97	20	60
94	Williams, D. W.	2.26	21	59
89	Ellis, L. E.	2.22	20	57
98	Hunt, G.	2.13	17	46
82	Smith, E. R.	2.00	19	34

AVERAGES.

	Blk. Orp.	Other Var.	W. Leg.	Total.
Total number of eggs laid during month	1,136	417	1,273	2,826
Average per bird	21.85	20.85	21.21	21.41
Total eggs laid to date	4,472	1,579	5,130	11,181
Average per bird per month for 5 months	17.2	15.8	17.1	16.94

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST, 1924 AND 1923, FOR COMPARISON.

Divisions and Stations.	Average Rainfall. Aug.	Average Rainfall. No. of Years' Records.	Total Rainfall. Aug., 1924.	Total Rainfall. Aug., 1923.
North Coast.	In.		In.	In.
Atherton	0·83	23	0·93	0·20
Cairns	1·76	42	3·16	0·76
Cardwell	1·32	52	1·94	1·21
Cooktown	1·34	48	1·40	0·14
Herberton	0·67	37	1·09	0·25
Ingham	1·42	32	5·60	2·20
Innisfail	5·24	43	5·32	3·71
Mossman	1·33	15	6·57	0·28
Townsville	0·49	53	2·68	1·69
Central Coast.				
Ayr	0·56	37	4·07	1·02
Bowen	0·70	53	0·90	0·51
Charters Towers	0·54	42	3·71	1·12
Mackay	1·06	53	0·56	1·23
Proserpine	1·36	21	3·36	1·36
St. Lawrence	0·91	53	0·66	0·88
South Coast.				
Biggenden	1·16	25	0·65	0·15
Bundaberg	1·38	41	0.50	0·80
Brisbane	2·11	73	1·35	0·70
Childers	1·29	29	1·48	0·26
Crohamhurst	2·32	30	1·86	1·35
Esk	1·56	37	1·91	0·41
Gayndah	1·23	53	1·27	0·32
Gympie	1·84	54	1·29	0·83
Glasshouse Mts.	1·58	16	...	1·18
Kilkivan	1·55	45	0·81	0·37
Maryborough	1·75	53	1·62	0·76

Divisions and Stations.	Average Rainfall. Aug.	Average Rainfall. No. of Years' Records.	Total Rainfall. Aug., 1924.	Total Rainfall. Aug., 1923.
South Coast—continued:	In.		In.	In.
Nambour	1·97	28	1·74	1·29
Nanango	1·42	42	1·00	0·56
Rockhampton	1·03	37	0·71	0·21
Woodford	1·84	37	1·19	0·90
Darling Downs.				
Dalby	1·23	54	1·77	0·35
Emu Vale	1·19	28	1·85	0·85
Jimbour	1·28	36	0·88	0·30
Miles	1·19	39	0·76	0·33
Stanthorpe	1·82	51	1·86	0·25
Toowoomba	1·75	52	1·39	0·59
Warwick	1·55	59	1·72	1·68
Maranoa.				
Roma	0·95	50	3·80	0·02
State Farms, &c.				
Bungeworgorai	0·80	10	3·91	0·01
Gatton College	1·17	25	1·75	0·39
Gindie	0·82	25	0·70	1·67
Hermitage	1·36	18	1·99	0·55
Kairi	1·02	10	...	0·48
Sugar Experiment Station, Mackay	0·95	27	0·46	0·90
Warren	1·00	10	0·44	0·12

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for August, 1924, and for the same period of 1923, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, State Meteorologist.

PROGRESS IN THE FAR NORTH.

ATHERTON TABLELAND AND DAINTREE RIVER.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report (29th September, 1924) by Mr. C. McGrath, Instructor in Dairying, on his recent visit to the Atherton Tableland and the Daintree River.

Bushy Creek.

This district has made decided progress during the past two years. A large area of scrub has been felled, burnt off, and grassed. The grasses favoured are *Panicum muticum* for the creek flats and paspalum for the slopes and ridges. The *Panicum muticum* grows luxuriantly on the flats, and when established safely pastures one to one and a-half beasts to an acre.

The stock were looking well, and it was pleasing to find that the dairy farmers are introducing pure-bred sires to head their herds.

The butter factory is centrally situated and adjacent to the partly constructed railway line. The factory is not yet fully equipped. A refrigerator of 8 tons capacity has been secured and is about to be installed. The output, which is marketed locally, is about 7 to 8 cwt. weekly.

About twelve suppliers are on the factory's books and others are engaged in preparing their land for farming and securing dairy stock. Through the decline in mining and the removal of the greater part of the millable timber, the district received a serious setback.

The establishment of the dairy factory at Bushy Creek and a modern bacon factory near Mareeba assures the successful settlement of this district.

Daintree River.

This district has made rapid progress since my previous visit some two years ago. The opinion then formed as to the suitability of the district for dairying is confirmed by the occupation of areas by experienced dairy farmers and the results obtained by them.

The rich scrub flats of the Daintree and its tributaries, when put under *Panicum muticum* grass, provide a luxurious growth of grasses and will carry two beasts to an acre. On the cleared slopes and ridges paspalum grass grows luxuriantly. Some 600 head of dairy cattle have been introduced to this district during the past two years, and further numbers are arriving as settlers fall, burn, and grass their holdings. This work is proceeding rapidly; some 3,000 acres are at present grassed with *Panicum muticum* and *Paspalum dilatatum.*

In visiting the dairy farmers I noticed that the improvements carried out and under construction were of a substantial nature and up to date. Three commodious milking sheds, to be equipped with milking machine plants, were nearing completion.

The dairy stock are being drawn chiefly from herds on the Atherton Tableland. Pure-bred dairy sires are being introduced, and the importance of breeding from pure-bred sires from good producing strains was stressed.

The dairy cows in profit are giving very satisfactory returns. The dairy stock were in excellent condition. The young stock are exceptionally well-grown. Milking Shorthorns and Jerseys are the sires chiefly used.

The season has been favourable and the pastures are excellent. The country is well watered by creeks and springs.

As the country is being opened up and ridges cleared, sites very suitable for residences and farm buildings are appealing to the settlers, and several new homesteads overlook the rich pastures of the river flats.

The dairy factory is located on a hill at the junction of the Daintree River and Stewart's Creek. The cream is conveyed to the factory in boats. The Daintree and its tributaries, including the Stewart and the Douglas Creeks, are more or less navigable for boats—a decided advantage.

The butter factory is well laid out and substantially constructed, and is furnished with modern equipment, including a batch pasteuriser. The location of the factory allowed for the adoption of the gravitation principle, and cream pumps are dispensed with. The factory has been constructed so as to allow for the installing of necessary additional plant to cope with increasing supplies. The building will house a plant

capable of treating a supply of 20 tons of butter per week. The output is some 8 to 9 cwt. per week, and will increase quickly as dairy cattle in or near profit are being brought up to the district. The output finds a ready local market in the Mossman and Port Douglas areas.

Atherton Tableland.

The following centres on the Tableland were visited:—Mareeba, Atherton, Yungaburra, Malanda, Millaa Millaa, Ravenshoe, Glen Alwyn, and Kairi.

An adverse season was experienced on the Tableland last year, the rainfall being much below average. The present season is, however, most promising, as splendid rain fell in July and August, ensuring an early spring and good growth of herbage and crops. This season's prospects for dairymen are very bright.

The maize crop is generally satisfactory, and marketing is under the control of the North Queensland Maize Pool Board.

The erection of silos at Kairi and Tolga, and a drying plant and silo at Atherton, enables the pool management to handle the season's crop expeditiously, as the storing capacity of the silos is about 6,500 tons. The bulk of the present maize crop was planted late on account of adverse weather conditions.

The silos at Atherton are receiving maize, which is cleaned and graded. This plant was doing its work very effectively, and all dust, dirt, and particles of cob are removed and a clean well-graded sample is delivered. It is a modern business-like method of handling this crop, and enables the producer to safely store his produce and place it regularly on the market, and so avoid creating gluts and low prices at one period and very often a scarcity and abnormally high prices at another period.

Owing to the diminished supplies of cream coming forward to the Atherton Co-operative Dairy Company's two factories at Golden Grove and Malanda, in consequence of the dryness of last season, the management decided to close the Golden Grove factory and to send all cream supplies to Malanda. The Atherton Co-operative Factory plant at Malanda is to be added to by installing two glass-lined cream-holding vats. By arrangement with the Railway Department the management of the company runs a rail motor to which is attached a trailer for the conveyance of cream to the Malanda factory. This motor runs between Millaa Millaa and Yungaburra to Malanda factory.

It is a satisfactory service and allows of the cream reaching the factory with as little delay as possible. Such a cream delivery service overcomes the disadvantage of farmers having to deliver cream overnight in order to catch an early morning train. The time of departure of the motor from the terminus of its run is arranged so that dairymen can deliver their cream on the rail on the morning the motor runs through to the factory. Such a method of delivery assists materially in improving the quality of the butter produced from such cream. The regular and quick service deliveries of cream to the factory should receive full consideration by all interested in the dairying industry.

Generally the dairymen depend on the pastures of sown grasses, chiefly paspalum and *Panicum muticum*, to provide fodder for their dairy stock the whole year round. A number of dairymen are giving attention to the growing of fodder crops to supplement the permanent pastures. The growing of these crops will become more general as the land is cleared and cultivated.

The establishment of the Atherton Co-operative Bacon Factory at Mareeba opens up for the Tableland a most profitable branch of dairy farming. The Tableland is climatically and agriculturally very suitable for pig raising and fattening. Maize, lucerne, and root crops suitable for pig feeding yield heavily on the Tableland. A rapid expansion of this industry is assured.

The output of the Atherton Co-operative Bacon Factory is highly spoken of and meets with ready sale in Northern markets. The management advise that the demand for their product exceeds the output. An addition to the factory's plant is now being made.

Some good dairy herds are being built up. Pure-bred sires are much in evidence among the herds, and this augurs well for the future improvement of the dairy stock. Cooled milk is being forwarded daily by rail from the Tableland to Mareeba and Cairns to supply the retail trade of those centres. Generally this portion of the State is making satisfactory progress.

The dairying industry will expand more rapidly now that its allied industry, pig raising and fattening, has a bright future assured by the opening of a modern bacon factory on the Tableland.

PLATE 88.—QUEENSLAND STATE INSURANCE TROPHIES.
BRISBANE CENTENARY PAGEANT.

ENTOMOLOGY

Plate 90.—"Pigs for Profit."—Departmental Activities Illustrated, Brisbane Show, 1924.

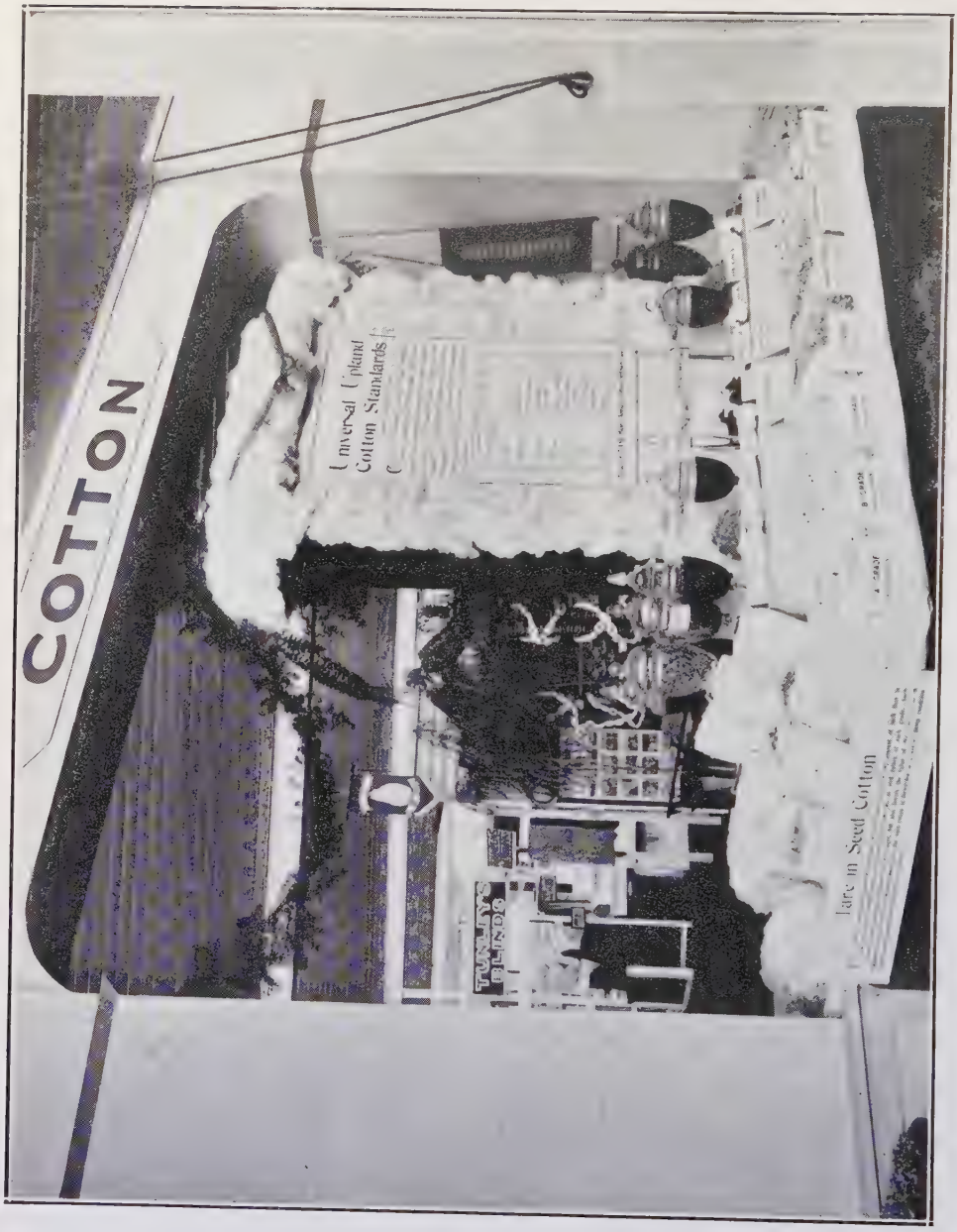


Plate 91. Cotton Trophy, Departmental Court, Brisbane Show, 1924.

Plate 92.—Mr. K. Haag's Winning "One-farm" Exhibit, Brisbane Show, 1924.

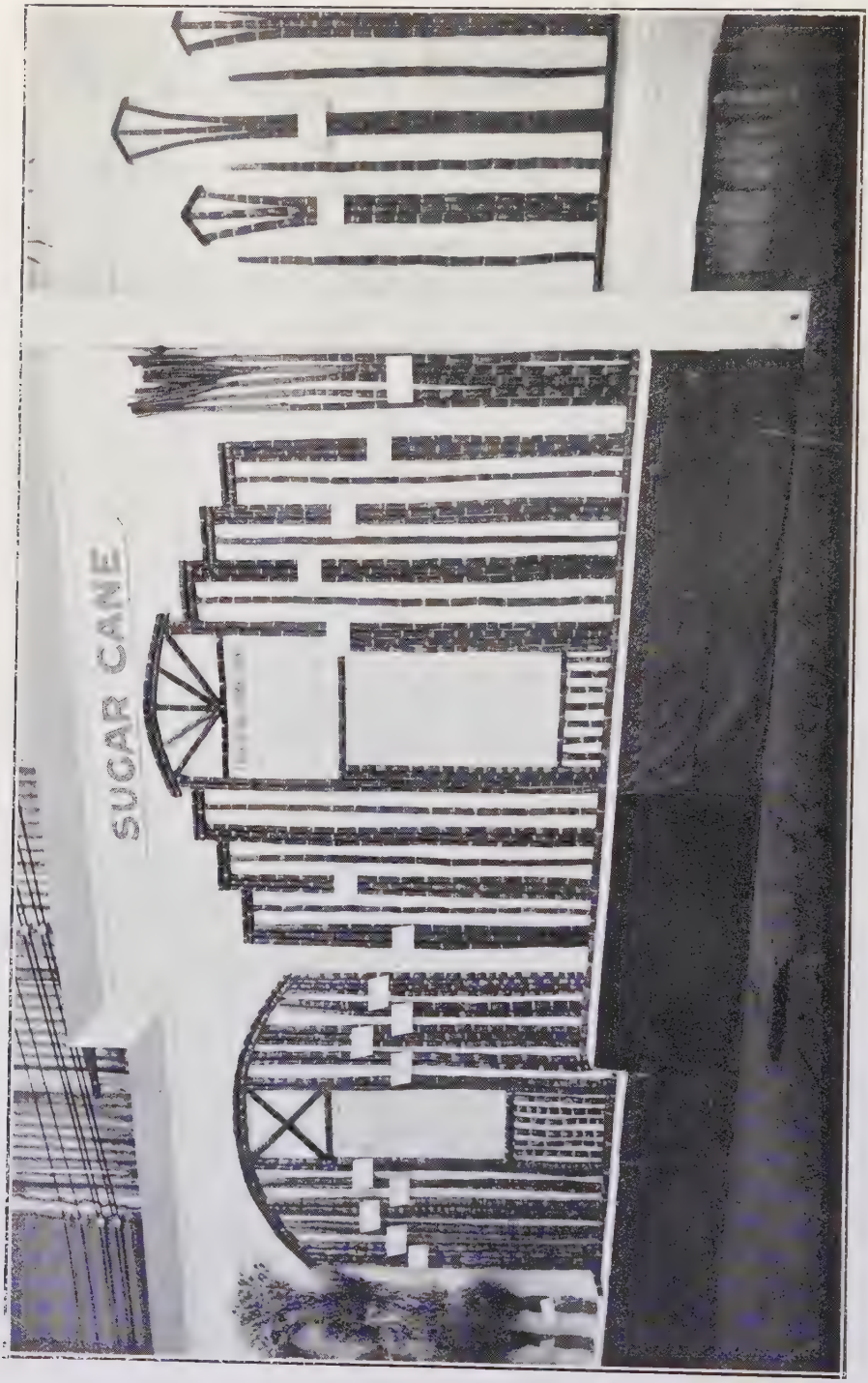


Plate 93.—Cane Display by Bureau of Sugar Experiment Stations, Brisbane Show, 1924.

PLATE 94.—The Northern Darling Downs (Dalby District) Winning Exhibit—Primary Products Only—Brisbane Show, 1924.

PLATE 95.—A FINE GROUP OF AYRSHIRES, BRISBANE SHOW, 1924.

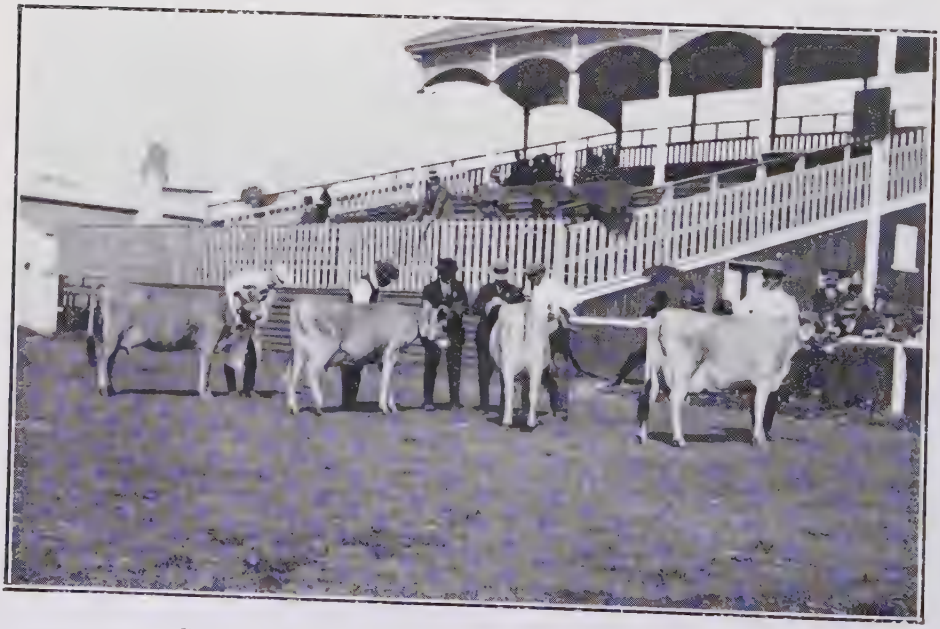


PLATE 96.—JUDGING JERSEYS, BRISBANE SHOW, 1924.

Plate 97.—Judging Illawarras, Brisbane Show, 1924.

Plate 98.—Parade of Government Clydesdales, Brisbane Show, 1924.

Plate 99.—Judging Friesians, Brisbane Show, 1924.

Plate 100.—Judging Ayrshires, Brisbane Show, 1924.

Plate 101.—Champion Blood Horse, Brisbane Show, 1924..
"Polybius," the property of Mr. M. F. Yore.

Plate 102.—Champion Milch Cow, 1924.
Elsie IV. of Oakdale, the property of Mr. B. O'Connor, Oakvale, Colinton.

POSSIBILITIES OF CAMPHOR CULTIVATION IN QUEENSLAND.

C. T. WHITE, F.L.S., Government Botanist.

The Camphor Laurel (*Cinnamomum camphora*) so common in Queensland gardens and as a street tree is the source of commercial camphor.

The cultivation of the tree, however, is one beset with great difficulty and has been tried with but little success in most tropical countries and of more recent years in the United States. The reason for this is that though practically all the trees produce camphor oil, it is only some of the trees that produce camphor.

Professor E. H. Wilson, who probably has a greater knowledge of the trees of China and Japan than any other man, writes interestingly of the Camphor Laurel. Among other remarks he says:—

"Small quantities of camphor are obtained in South Japan, in Fokien and Kwangtung provinces of China, but the real industry is confined to Formosa. Apparently the climatic conditions there are more favourable to the secretion of the necessary hydro-carbons than elsewhere. It is a curious fact that not every camphor-tree yields camphor in appreciable quantities, neither is every part of the tree equally rich. Often it happens that in two trees growing side by side one may be rich in camphor and the other almost devoid of it. Sometimes it happens that one side of the tree may be richer than the other. Why these marked variations in the quantity should be there is no telling, but the fact remains. Some day it may afford the plant hybridist opportunity to breed a race of camphor-trees all equally rich in camphor. Chinese do most of the work of camphor distilling in the forests of Formosa, and they are expert in telling by means of smell and taste which trees are profitable to work and which are not. The bole of the tree is usually richest and frequently the thick, buttress roots rank next. The work of felling the tree is sometimes done in piecemeal fashion. The wood is reduced to thin chips by means of an adze or gouge-chisel and is then ready for camphor distillation. From the crude stills in the forest the camphor and camphor oil is taken to the factory of the Monopoly Bureau, Taihoku, and refined.

"However, the tree is becoming rare, which should occasion no surprise when it is remembered that its destruction has been in progress since the sixteenth century and with increasing rapidity. Admitting that there are districts in which the camphor-tree grows yet to be exploited, it needs no prophet to foretell a shortage in the near future. The Japanese Government has realised the fact and commenced planting in the northern parts of Formosa on quite a large scale. I saw these plantations and they are thriving, but there will be lean years before they are available as a source of supply.

"There is another fact worthy of record which may have great or may have no effect on the yield from plantation camphor. In Formosa the wild camphor-trees are tall and gathering the fruits has been found to be exceedingly difficult and costly. The Camphor Monopoly Bureau, therefore, has purchased and continues to purchase its stocks of camphor-tree seeds in Japan, where in temple grounds the gathering of the seed is a simple matter. So the situation is that plantation camphor in Formosa, and for that matter everywhere else in the world, is the product of Japanese camphor-trees. Whether trees of this origin will produce camphor in quantity and quality comparable with that of the Formosan trees has yet to be proved."

It will be seen from the foregoing remarks that if we imported seed from Hong Kong or even from the Forestry Department at Taihoku we would probably only get what we already have in quantity—the seed of the Japanese tree. If the industry is to be started in Queensland as a secondary forests industry, the best method to adopt would be to try a number of the trees already here for camphor and keep seed from those giving the best yield.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

The tree whose stem and foliage specimens are shown in the accompanying photographs, is known at Imbil, on the Mary Valley Line, as White Bark, and in botanical nomenclature as *Endiandra compresso.* Its two most common features are its white bark and its large black or dark-blue fruit containing a large single seed. The fruit as well as the seed are frequently compressed or flattened in a vertical plane. The species is common at Imbil and has been found also on the Blackall Range, near Mapleton and Eumundi.

Photo. by Authors.]

PLATE 103.—ENDIANDRA COMPRESSA.
A tree growing in the Imbil rain forest.

Photo. by Dept. Agriculture and Stock.

Plate 104.—Endiandra compressa.
Showing leaves, flowers, and a dry fruit.

THE BRITISH LARGE BLACK BREED OF PIG.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The British Large Black Pig, also called the Large Black, is another of the old English breeds noted for hardiness and good grazing qualities. Like the large Yorkshires, they are not in general as popular as the Tamworths or the medium breeds (the Berkshire, Middle York, or Poland-China), and the only purpose for which this type can be used in Australia is for cross-breeding with the medium breeds. In this case it is advisable to use sows of this large type and boars of one of the three medium types named above. The sows of this type (*i.e.*, the crossbred sows) mated back to the Berkshire boar will prove excellent mothers.

These lastnamed crosses are really three-quarter pure, *i.e.*, they have two strains of the medium type to one of the large, and are excellent bacon pigs, but in the purebred state the Large Black has proved quite unsuitable to our market requirements, and so long as the demand is for a light to medium weight bacon pig these conditions are not likely to vary much. The reason for this is that the purebred Large Blacks carry a rather heavy percentage of offal; and, being a large fleshy breed, they require comparatively heavy feeding, so that unless supplied with ample nourishment they will not prove satisfactory.

The crossbred pigs provide a lengthy fleshy side of bacon, and when used with the Berkshire or other breeds named, the flesh is much improved in quality. The Berkshire boar crossed on to the Large Black sow can be regarded as an ideal cross. On no account should Tamworth or Large Yorkshire boars be mated with them. One valuable characteristic of the type is their prolificacy and docility, and in general the progeny are sturdy, and grow quickly.

The more recently introduced pigs of this breed (see Figs. 1 to 3) appear to be a great improvement on the types of years ago, and will go a long way towards restoring their one-time popularity here.

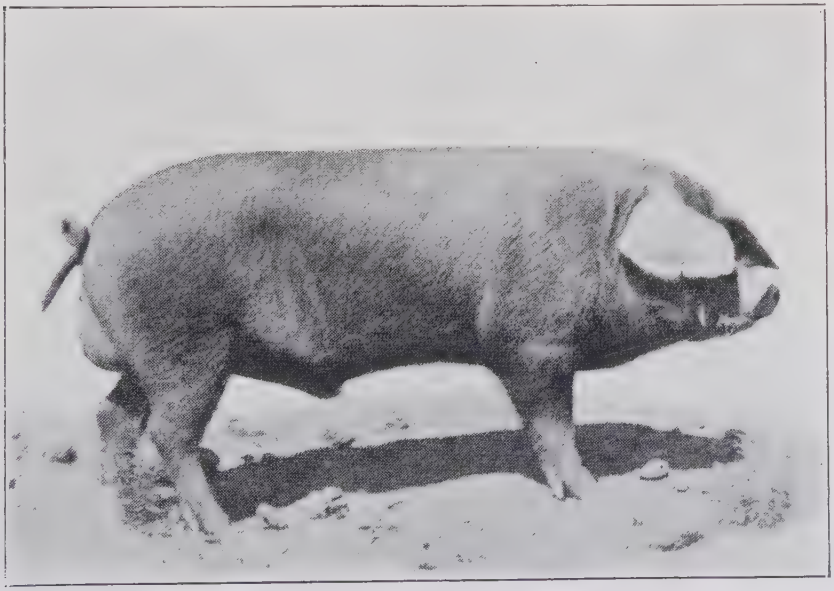


Fig. 1.—"Playford Eros," (Reg. No. 26333).
Large Black Boar, imported by Mr. W. Barker, of Bendigo, Victoria.
Note the characteristic type, the length and quality of this animal.

FIG. 2.—"SWARDESTON DEVOTE" (IMP.) NO. 25, PROPERTY OF W. E. BARKER, BENDIGO EAST, VICTORIA.

This sow was injured in transit to Australia, hence does not show to advantage. She has a great depth of ham, a deep side, and a well-developed line of teats.

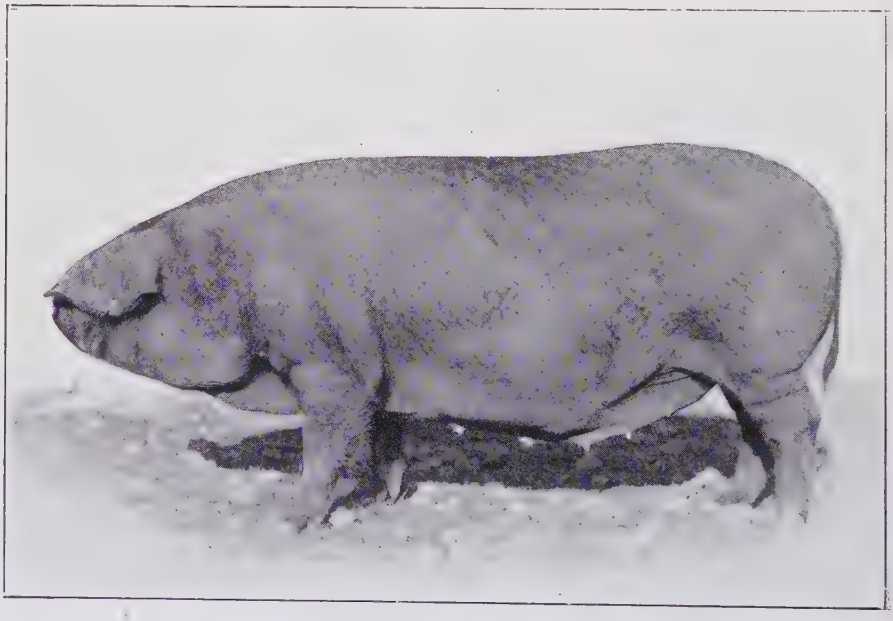


FIG. 3.—"HENHAM QUEEN BESS 5TH," (Imp.) NO. 26, PROPERTY OF W. E. BARKER, BENDIGO EAST, VICTORIA.

This sow has great length of body and is of characteristic type and quality.

A short historical account of the breed proves of interest, and here is what the Large Black Pig Society of England has to say about it:—"The antiquity of the breed is beyond doubt, for there is ample evidence that the Large Black pig, with its characteristic whole colour, its length, fine hair, lopped ears, and great grazing capacity, existed in many parts of the United Kingdom at a date prior to the memory of any of the present generation of breeders. The pig is a native of Cornwall and Devon, and, although it has only been registered in the stud-book of England for twenty-five years, it has come to the front with amazing rapidity, and is now regarded as one of the most prolific and popular of all the British breeds."

The first importation of this breed into Australia was made by Mr. Herbert Garratt, of "Loch Maree," Randwick, New South Wales, in 1904, when he imported a boar and two sows, great prize winners, of good type and quality. These animals formed the nucleus of a successful stud, which at its dispersal was considered one of the best in New South Wales. Owing to business reasons and failing health, Mr. Garratt relinquished pig breeding in 1909, the whole stud being purchased by the New South Wales Government for the Hawkesbury College and Wagga Experiment Farm studs. Mr. Garratt's first importation was so successful that he later imported several other animals of very high quality. He "boosted" the breed, and was largely instrumental in popularising it amongst pig-breeders in New South Wales.

The Crossbred as Bacon Pigs.

With regard to the young pigs from the crosses named, it may be said that they make up into excellent quality bacon pigs, when from five-and-a-half to six or six-and-a-half months old, if intelligently fed. As porkers they are inclined to be too growthy, and do not fatten readily until about five months old. This, of course, is characteristic of the large breeds at all times. The Large Black sows usually develop very large udders and are particularly heavy milkers; in this connection it is interesting to note that this charactertistic is hereditary, as is well known with the deep-milking strains of dairy cattle; unfortunately, many of our improved strains of pigs lack the heavier milking capacity. It is absolutely essential that the sow should be able to rear her litter, otherwise the result must always be unsatisfactory. On the English markets, the Large Black breed is evidently more popular as a stud pig than it is in Australia, for at a recent sale of stud stock, some very high prices were obtained for selected boars and sows.

To breeders that fancy this type, but are unable to obtain satisfactory stud animals, the writer's advice is, try the Tamworths, remembering all the time that these large breeds require ample food supplies and constant attention, and are more satisfactory as bacon than as pork pigs.

Fresh Importations.

Up to within recent months it has been almost impossible to secure boars or sows of this breed here, but a fresh importation has recently been made by Mr. W. H. Barker, of California Gully, Bendigo, Victoria, and by his son. Mr. W. E. Barker, of Bendigo East, Victoria. These pigs were selected in England through His Excellency Lord Stradbroke, Governor of Victoria, himself an ardent admirer of the breed as well as a noted breeder of Large Blacks. During his visit to England some time ago he selected for Mr. Barker a number of noted representatives of famous Large Black studs, and this was the principal factor leading up to their introduction into Victoria.

From these importations Mr. Barker has built up his present stud and has quite recently reported sales of these pigs to Western Australia, as well as to New South Wales and some of the dairying districts of Victoria. Mr. Barker's experience of the breed has been summed up in this conclusion:—

The Large Blacks are noted for prolificacy; economical to handle; possess unequalled early-maturing qualities; they are hardy, healthy, and an excellent dual purpose pig; they are docile and even-tempered; they are unsurpassed as graziers.

He states as evidence of the prolificacy of these strains that in one well-known herd of pedigreed pigs four sows farrowed fifty-three young pigs between them; in another case he instanced where a boar of this breed had been turned in with ten breeding sows with a result that at farrowing time ninety-eight young pigs were born.

An illustration of the prolificacy of a young sow on her first litter was also mentioned, the sow giving birth to thirteen pigs. At fifteen months old, of four sows out of a famous prize-winning sow, one farrowed thirteen pigs, two eleven each, and one ten—forty-five pigs from four first litters. Another Victorian breeder, Mr. P. J. Nichols, of Ondit, in the Western district, reports very gratifying results.

He has proved the prolific qualities of the breed with a sow from which he reared seventy pigs in seven litters which totalled seventy three pigs.

In support of the contention that this breed is economical to keep, a contention in which a number of Queensland breeders who have the crossbred Large Black Berkshire sows concur, is that they are admirably adapted as a grazier, thus they are particularly suited to the paddock system of pig raising. The writer has also had considerable experience in grazing Large Blacks and knows their value for this purpose.

They certainly are docile and of good disposition, features which doubtless are to an extent the result of careful selection and breeding over a long series of years. The ears lopping over the eyes doubtless also tends towards keeping the animal contented; they cannot see as well as some of the "prick-eared" breeds, though their sense of smell is particularly well developed.

Overseas experience with the breed for many years past points to their increasing usefulness and popularity both from a bacon curer's standpoint as well as from that of a stud breeder. From the point of view of the farmer desirous of securing early maturing stock these results are worthy of note.

At a recent Smithfield Show (England) Large Blacks put up a wonderful performance, giving an average gain, taken over all the Large Blacks in the show, of 1.47 lb. per day per head from birth.

In one of the largest pedigree herds in Great Britain, at the age of twelve weeks the young Large Blacks averaged 62 lb. each. Another breeder, reporting at same age, had averaged 95 lb. for boars and 84¾ lb. for sows. Still another had a sow at seven weeks which was reported as weighing 54 lb., others at sixteen weeks weighed 124 lb. each.

The Large Black Pig Society reports that the Whitley Cup at the London Dairy Show for the best bacon, all breeds competing, has twice been won in succession by the Large Black breed.

The scale of points in judging this bacon was as follows:—

	Points possible.	Points gained.
Correct proportion of cuts or joints, including thickness and streakiness	30	28
Suitability of side, quality of meat, bone, &c.	20	18
Fat on back, lean meat, proportion of lean to fat	30	25
Firmness of fat	15	15
Fineness of rind	5	5

Total points gained, 91 out of 100.

A further proof of the prolificacy of Large Blacks was referred to by Mr. Barker, who reported that three of the imported sows farrowed forty young pigs on the voyage out to Australia.

Another point in favour of the Large Black is their whole black colour, which makes them particularly adapted to grazing.

Large Black Pigs—Scale of Points.

	Points.
Head—Medium length, and wide between the ears	5
Ears—Long, thin, and inclined well over the face	6
Jowl—Medium size	3
Neck—Fairly long and muscular	3
Chest—Wide and deep	3
Shoulders—Oblique, with narrow plate (or shield)	6
Back—Long and level; rising a little to the centre of the back not objected to	12
Sides—Very deep	10
Ribs—Well sprung	5
Loin—Broad	5
Quarters—Long, wide, not drooping	8
Hams—Large, well filled to the hocks	10
Tail—Set high, but not coarse	3
Legs—Short and straight	5
Body and Flank—Thick, well filled	8
Skin—Fine and soft	4
Coat—Moderate quantity of straight silky hair	4
Total	100

Objections.

Head—Narrow forehead, dished nose.
Ears—Thick, coarse or pricked.
Coat—Coarse or curly, bristly mane.

Disqualifications.

Colour—Any other than Black.

Details of the Imported Stock.

The stock imported from England by Mr. Barker consisted of one boar and four unrelated well-bred sows. The boar is "Playford Eros" (Fig. 1), born August, 1922, bred by Mr. S. R. Sherwood, Playford, Ipswich, England, by "Sudbourne Prospect," ex "Playford Venus." The sows are (1) "Swardeston Mozelle," born May, 1922, bred by Mr. A. Beverley Ringer, Mere House, Seething, Brooke, Norwich, by "Martham Hero," ex "Swardeston Moongirl." Her grand dam, "Swardeston Moonlight 6th," gained the championship of the Large Black Pig Society at the Leicestershire, Rutland, and Lincolnshire Shows, in 1920, in addition to a number of first prizes the same year. (2) "Swardeston Devote"

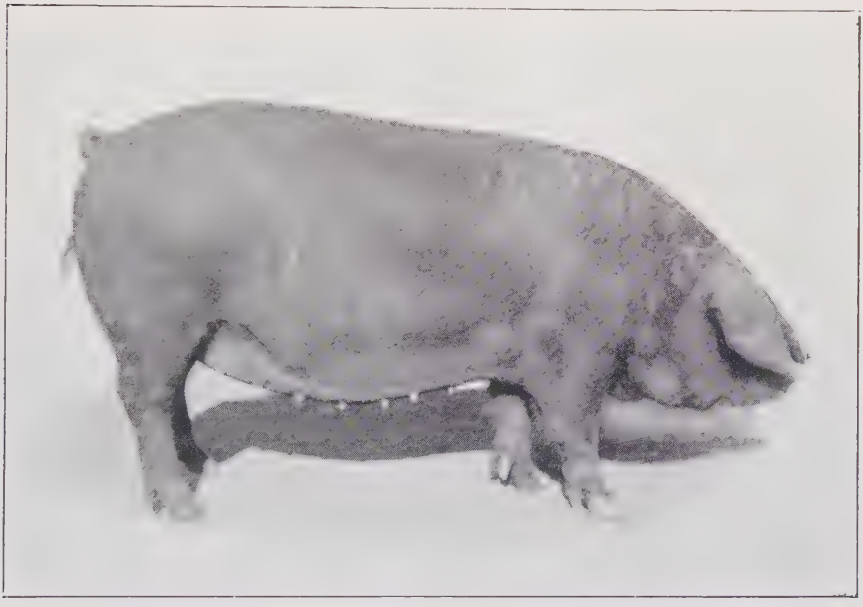


Fig. 4.—"Beverley Girl" No. 34, imported in Utero and now the Property of Mr. Barker.

A great quality sow. Note the evenly-developed, well-placed line of 14 teats.

(Fig. 2), born June, 1922, bred by Mr. A. Beverley Ringer, by "Bygrave Challenger 2nd," ex "Reydon Discovery." (3) "Westland Rosebud 2nd," born August, 1922, bred by Mr. J. W. Rickeard, Scot's Hall, Westleton, Suffolk, by "Westleton Earl," ex "Westleton Rose." (4) "Henham Queen Bess 5th" (Fig. 3), born May, 1922, bred by the Earl of Stradbroke, Henham Hall, Wangford, Suffolk, by "Horsham That's Him," ex "Henham Queen Bess 4th." Before leaving England "Swardeston Mozelle" and "Swardeston Devote" were served by "Treveglos Pride," "Westleton Rosebud 2nd" was served by "Valley Sportsman," and "Henham Queen Bess 5th" was served by "Theberton Dutchman." The grand dam of "Treveglos Pride" is "Treveglos Lass 20th," which was first at the Royal Show, in 1923, for sows born in or before 1921, and first at the Bath and West Show the same year. As will be noticed, the pigs imported by Mr. Barker are descended from prize-winning stock at the leading English shows. The sows "Swardeston Devote" and "Henham Queen Bess 5th" were purchased by Mr. Barker for his son, Mr. W. E. Barker, who has founded a stud at Bendigo East. Mr. Barker, senior, has kept three sows and a boar from "Swardeston Mozelle's"

first litter by "Treveglos Pride," and one sow and a boar out of "Westland Rosebud 2nd," by "Valley Sportsman." "Westland Rosebud 2nd" has recently farrowed to the "Swardeston Mozelle" boar, and she is rearing twelve sturdy piglings out of a litter of fourteen. One of "Swardeston Mozelle's" daughters is rearing a brood of nine by the son of "Westleton Rosebud 2nd." The young breeding stock has grown wonderfully since the Bendigo Show last October. They have not been forced in any way, the sows being run out on pasture and only receive a little slop feed once a day. It has not been necessary to ring one of them, and they do not root or attempt to get through or under fences. Unfortunately, "Swardeston Devote" was injured on the voyage out, and after reaching Victoria she farrowed a litter of fourteen dead pigs. In addition to "Swardeston Devote," Mr. Barker, junior, has "Henham Queen Bess 5th" and a boar and two sows out of her by "Theberton Dutchman" in his stud, and they are of promising appearance. The lineage and splendid quality of these pigs will, no doubt, do much to bring the Large Black into popular favour in Australia.

The sow "Beverley Girl" (Fig. 4), bred by Mr. W. E. Barker, is served by "Theberton Dutchman," and is from "Henham Queen Bess 5th." Fig. 5 is of a trio of Large Black sows owned by Mr. Gordon E. Frost, an English breeder. These sows when four months and three weeks old won first prize at the Essex County Show at Harlow (England).

Fig. 5.

A trio of Large Black Sows owned by Gordon E. Frost, a noted English Breeder. These sows at 4 months 3 weeks old won first prize at the Essex County Show at Harlow, England. The photograph was taken at the Show by the "Agricultural Gazette" Photographer, England.

A GREAT FARROWING RECORD—THE LARGE BLACK-BERKSHIRE CROSS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

That the pig is a producer as well as a rent payer is evidenced by the following record supplied by the owner, Mr. Warden P. Shepherd, of Bannister, *viâ* Goulburn, New South Wales. Mr. Shepherd writes as follows:—"I am only too pleased to give you as many particulars of my sow and her litters as is possible. The sow is out of a British Black sow and by a Berkshire boar. She is about 3½ years old, and would weigh when fat over 3 cwt. Her last four litters have all been by a pure-bred Berkshire boar; the litters were 14, 16, 13, and 22 respectively; a total of 65, making an average of just over 16 suckers per litter. The last lot are doing well, and are by no means small or stunted, with the exception of one small fellow.

"Before farrowing I fed the sow, together with other sows, on boiled wheat, raw turnips, and a little milk, there being always water in the paddock. The suckers are generally 8 to 10 weeks' old before I sell them. They are readily sought after in this and the Goulburn district, as they are a very fine class of pig for porkers, and also bacon pigs.

"I have only kept one sow of this particular sow's progeny for breeding purposes. I sold this young sow after having one litter from her. She had 12 suckers and reared 11, which were sold for 31s. each at eight weeks old. Twelve out of fourteen of the record sow's first litter averaged just over £2 per head at ten weeks old. I sell the pigs, as a rule, at from 8 to 10 weeks old, and usually get three litters from a sow in about 16 months."

Such a record as the foregoing is surely a creditable one, and is definite proof that, provided the right class of breeding stock is selected in the first instance, and that they are given reasonable care and attention and liberal supplies of food, payable results might be expected.

The British Large Black cross sow mated back to a Berkshire boar should be an ideal bacon pig, a pig whose carcase should suit the present demand for a medium-weight, fleshy bacon.

MIDDLE YORKSHIRE TYPES.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Several inquiries have been made recently whether it is advisable to keep Middle Yorkshire pigs in Queensland. One farmer, residing in the Granite Belt, fifty or more miles on the Queensland side of the border, and in the comparatively high mountainous country around Stanthorpe (the Summit is 3,030 ft. above sea-level), recently wrote asking if this white breed would be suitable for his locality, and, if so, whether it would be advisable to cross the sows with a Berkshire boar.

Another farmer, residing nearer Brisbane, said that he had purchased several Middle Yorkshire sows, not knowing much about pigs, but was puzzled to know what class of boar to mate with them, for, as he said, "Tom comes along and recommends a Tamworth, insisting that there is no better breed; then Bill comes along and reckons that Tom knows nothing about pig-breeding, and he promptly advises the use of a Berkshire—and so it goes on." Another farmer has read that the Large Black makes a suitable cross with the Yorkshire.

Now, there is no hard-and-fast rule with our various breeds of livestock; all the breeds are suited to some condition or other, just as it must be admitted that Middle and Large Yorkshires have their place. It would not be right to say that they were breeds unsuited to Australian conditions, as they have enjoyed a great run of popularity here for many years, and in Victoria, South Australia, and many of the southern districts of New South Wales are still great favourites.

On the other hand, conditions generally are against the Yorkshires, as we go north from the northern districts of New South Wales, and there are many districts in Queensland in which the local conditions are unfavourable to white pigs—not to say that Queensland is as hot a place climatically as many Southerners believe, but because the humidity is greater, and in many of the newer dairying districts the pigsty accommodation is very limited and is frequently unsuited even for black and red pigs.

It is for this reason that we would urge all pig breeders to give serious thought to local conditions if they are thinking of introducing white pigs. The Yorkshires are admirable sty pigs, and are specially suited to the requirements of the suburban pig farmer and the stud pig breeder who has superior accommodation and can protect his pigs against the vagaries of the extremes of weather. Given proper care and attention, there are no more prolific or profitable pigs than Yorkshires; but, on the other hand, where conditions are unsuitable, there are several breeds that will prove better paying propositions.

In answer to the question as to the most suitable type of boar to use in cross-breeding where the Yorkshires are being used, the writer advises Berkshires or Poland-Chinas, as these breeds are by nature better suited for crossing with the Yorkshires than the Tamworth or Large Blacks. In any case, these latter breeds should not be crossed with the Large Yorkshires, otherwise the resulting progeny will be too growthy, and will not mature early enough for our market requirements. The Tamworth does not cross so beneficially with white sows as the Berkshire or Poland-China, though where these pure-bred boars are used on Yorkshire cross sows better results are obtained. The British Large Black pig crosses well with the Middle Yorkshire for the production of bacon pigs, but it must be remembered that too much Large Black, like too much Tamworth, is undesirable and should be discountenanced, otherwise the pigs will be too large and will be late maturing.

The more recently introduced type of British Large Black is a far superior type to the "Blacks" we had in Queensland years ago; they now have so many good points as to be well worth consideration as a cross.

At any rate it will pay to give careful thought to the subject if it is desired to test the Yorkshires, of which but one type, the Middle Yorkshire, seems to survive. The Middle Yorkshire is an unsatisfactory pig at present from the point of view of the stud breeder, as there is little or no demand for boars or sows, at least that is the case in most parts of New South Wales and Queensland. Therefore, the farmer interested in the breeding of stud pigs had better, for the present, devote his attention to Berkshires, Tamworths, Poland-Chinas, or the other more recently introduced breeds, and let the existing Middle Yorkshire breeders cater for the limited demand for fresh breeding stock of this variety.

MAIZE REAPER THRESHER.

A Queenslander, Mr. George Iland, of Toowoomba, has invented and patented a machine to harvest, thresh, and bag maize by operating on a ripe standing crop in the field, and has also arranged to have the machine—the Eclipse Maize Reaper Thresher—manufactured in Toowoomba.

The opinion formed after a close examination of the machine and of the excellent work accomplished under average working conditions, was that this complete harvesting device will not only reduce maize harvesting and threshing costs to a minimum, but will eventually prove to be one of the most notable agricultural inventions of modern times. Actually, the cost of harvesting was shown by a farmer who purchased and worked one of the machines to be 2½d. per bushel, allowing for fuel, wages, horses, interest on capital value, and depreciation.

Four horses are used for drawing the machine, the rest of the work being effectively dealt with by a motor auxiliary mounted on the main frame in proximity to the driver.

The process of harvesting is continuous, the maximum quantity of grain harvested during a day of eight and a-half hours equalling 360 bushels. The stalks with adhering cobs are gathered in as the machine is drawn along the row by a series of "rake" chains, which work at convenient positions on the inside of a pair of extension arms which straddle the row of maize operated on. In the harvesting process these stalks are cut off about 15 inches from ground level, and simultaneously, by means of several pairs of plain and serrated edged circular saws, are cut into separate lengths, each about 12 inches long. Cut up in this form they are elevated to the threshing drum, where the ears are husked and threshed, the grain passing either through the concave grid or the trash walkers on to the grain tray; the stalk residues, husks, and cores dropping to the ground behind the machine.

In the cleaning process, the grain is subjected to a strong blast of air when passing through the riddles; gravitating into the elevator boot, it is lifted to the grain-bagging hopper. Bagging (carried out on a platform drawn along at the back of the machine for the purpose) is a continuous process, which, in the 60-bushel crop the machine was working on when inspected, entailed rapid work by the one man it was allotted to. Obviously, the maize-harvesting machine should only be used when both stalk and grain are in a thoroughly dry condition. Frosts occurring immediately after the crop ripens are of assistance in the drying process. Although the machine is designed to lift lodged stalks, and does effectively lift and harvest the grain from any stalks which are leaning over or across the rows, it is an advantage to have an erect, light-stalked crop to operate on.

Where it is purposed to use the maize reaper thresher it is also an advantage to sow the seed right round the field to admit of the rows of corn being continuous.

Reference to the excellent work which this machine does would be incomplete were not attention drawn to the condition of the field after it has been used to take off a crop. Actually, all stalks and trash are in a fit condition to plough in, a circumstance representing a great saving in time and labour in field operations.—H. C. Quodling, Director of Agriculture.

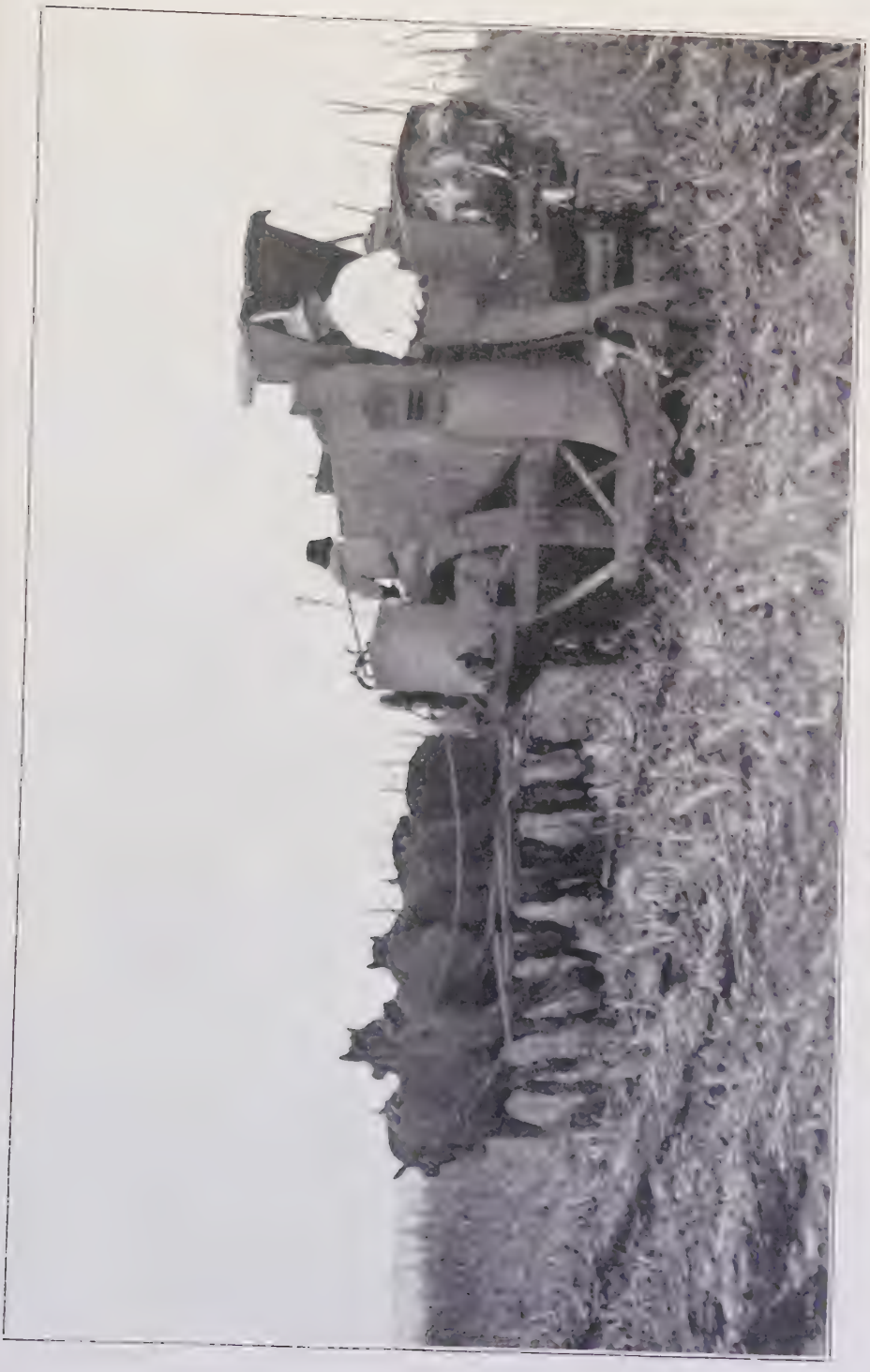


PLATE 105.—MAIZE REAPER THRESHER AT WORK.

PLATE 106.—CLEANLY-THRESHED SAMPLE OF GRAIN TURNED OUT BY THE MACHINE.

Plate 107.—Condition of Field Immediately after Removal of Crop.

Plate 108.—"Eclipse" Maize Reaper-Thresher.
Horse-drawn, engine-functioned.

THE MOST SUITABLE PIG FEEDS.

One of our subscribers asks for information as to the most suitable food for young pigs after they have been weaned and until they have passed the medium porker stage. Our friend states that he has a limited supply of skim milk and large quantities of barley and corn (both in the green stage), and also oats, as well as some last season's grain. There is also available a plentiful supply of sweet potatoes and a good crop of pumpkins. The problem for solution is—how can these be used for feeding young pigs to the best advantage. The matter was referred to Mr. E. J. Shelton, Instructor in Pig Raising, who supplies the following answer:—

It is preferable to cook the food given to your young pigs and feed the corn (grain), pumpkins, and sweet potatoes as a mash, thinned down with water or skim milk, to the consistency of thick porridge. We would also suggest feeding only a small quantity of corn for a start (preferably crushed) and to gradually increase this as the pigs grow until, as they approach the fattening stage, the amount of bulk can be reduced and the pigs "topped up" principally on grain.

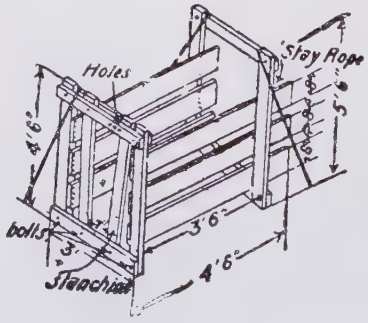
The best protein (or flesh-forming) foods to be used in addition to pumpkins and sweet potatoes are green foods, such as lucerne, barley, green corn stalks, grasses, sweet potato tops, &c. With these available there should be no need to purchase concentrated protein meals, such as meat meal, linseed oil meal, or other like preparations. Probably peas or cowpeas might be grown, the grain from which makes an ideal and a very cheap protein ration. As the season advances, too, there will probably be a more abundant supply of skim milk, than which there is no better growing food for young pigs if it be supplemented with grain in the manner suggested.

It may be mentioned that there is no better grain food for young pigs or for those fattening for well grown stores than barley meal, but you should be careful to crush the grain thoroughly though not to a powder. Barley meal as the grain portion of the ration, supplemented with skim milk, lucerne (both green and as hay), green barley, and oats form a most suitable diet not only for young pigs, but for breeding sows and boars.

Grains should be cooked; the young pigs seem to be able to assimilate the food better, and it is more appetising, though, on the other hand, the margin of profit between cooked and uncooked foods is a very narrow one, and would not justify much money being spent on the purchase of fuel. Cooking also means that one may feed the food warm during cold weather; one may also utilise any meat available, and where calves are being killed off or when old store cows, &c., are slaughtered this is a decided advantage, but the meat should be thoroughly cooked and mixed with the other foods in the manner suggested to obtain the best results.

CATTLE CRATE.

The cattle crate illustrated, taken from the quarterly bulletin of the Michigan (U.S.A.) experimental station, has been in use there for three years, and has proved especially useful in transporting cattle for breeding purposes, or when sold or



exchanged. It may be used either in a wagon or in a motor-truck. Two such crates fastened together can be used on a flat rack, as a double unit. The usual dimensions are 4 ft. 6 in. long, 3 ft. wide, 4 ft. 6 in. high in front, 5 ft. 6 in. high at the rear. The remaining details of construction can be gathered from the illustration.

General Notes.

A Novel Type of Silo.

During the past few years ensilage has gained considerable favour among arable farmers, and the tower silo is becoming a familiar feature of farm steadings. Tower silos are being made of various materials, and in the neighbourhood of Worcester there may be seen three silos which were at one time the funnels of an Atlantic liner. These have been in use for a number of years, and give good results. —J. R. Bond, in the "Journal of the Ministry of Agriculture," England.

Rural Life in Denmark.

Rural life in Denmark forms a vivid contrast to rural life in this country. Here the unrelieved monotony of the countryside has caused a rush to the cities and large towns. In Denmark the universal use of electrical energy has brought most of the comforts and some of the attractions of modern civilisation to the countryside, where contented people labour with a light heart.—E. O'Shaughnessy, in the "Journal of the Department of Agriculture and Technical Instruction," Ireland.

Milk Recording in Denmark.

In 1895 the first Danish Milk Recording Society was formed by thirteen farmers, who owned together just over 300 cows, and who combined to employ a man to record the yield of milk and its content of butter-fat from each cow on their farms. Other groups of farmers followed suit as the practical value of the information obtained and its importance in cattle-breeding became recognised. Now there are in Denmark 825 recording associations, dealing with 25 per cent. of all the cows in the country, or upwards of 300,000.—"Scottish Journal of Agriculture."

A Jersey Record.

The young Jersey cow, Sylvia's Pet, born 5th May, 1920, on her first calf when 2 years 144 days old, yielded 10,175 lb. milk, 564 lb. fat, in 363 days, and calved again on 4th November, 1923. She was fed 30 lb. swedes, 14 lb. potatoes, 15 lb. clover hay, 2 lb. oats, 2 lb. maize, 2 lb. oil cake, or a total of 24 lb. of dry matter per day. Her dam, Sylvia, yielded 6,130 lb. milk, 5.6 per cent. of fat, in forty-five weeks, and her grand-dam, Spangle, produced 8,050 lb. milk, 4.9 per cent. of fat, in forty-seven weeks. These figures are verified by the English Jersey Cattle Society.

The Problem of Pest Control.

Many an isolated fact, apparently of no economic importance, has subsequently proved to be a vital link in a chain of facts that have a far-reaching practical value. Instances might be multiplied from all over the world where much might have been done to control insect pests with a minimum of delay if only more had been known beforehand as to their life-history and distribution. If, for instance, we had known fifteen to twenty years ago what we know now about the pink boll-worm of cotton (*Platyedra gossypiella*), which is probably indigenous only in India, and is an imported pest in Egypt and elsewhere, what vast sums of money could have been saved, and how much better the prospects of controlling this most serious menace to the cotton crop of the world would have been!—S. A. Neave, in "The Empire Cotton Growing Review."

Red Polls in England.

Red Poll cattle were shown to great advantage at the English Royal Show. The champion bull, Hatton Fabulist, four years old, from a cow which has averaged over 9,000 lb. of 4 per cent. milk for the last five years, weighs 1 ton. The second bull in the same section weighed still more, and the third bull, Knepp Crown, scaled 23 cwt. The champion cow, Royal Mavis, won premier honours for H.M. the King in the previous year. A fourth prize was won by S. W. Copley, a West Australian settled in Herefordshire.

Grissenhall Wild Girl, a Red Poll eight year old, belonging to Mr. J. B. Dimmock, Harleston, Norfolk, has yielded 20,060 lb. milk in 365 days, and was giving 50 lb. a day after milking for thirteen months. At the London Dairy Show she won the National Cup for cow giving the biggest weight of milk in proportion to live weight.

Silage and the Quality of Milk.

The opinion is held by some farmers that silage will taint the milk of cows to which it is fed. This opinion has not been confirmed by official feeding trials with silage at Wye (England). "On no occasion," says a report in the "Journal of the Ministry of Agriculture," "has any bad flavour been noticed, and during the time the 1922-23 trial was being carried out the college herd was included in the Kent clean-milk competition, in which it was placed second. While the competition was in progress the milk was examined periodically by a dairy expert." It is added that the fat content was taken regularly during the trials, and that the records did not indicate that the change from roots to silage, or *vice versâ*, had any definite effect upon the quality of the milk.

A Wonderful Country.

Acknowledging a civic reception at South Brisbane recently, the Governor-General, Lord Forster, said that the more one was able to travel about Australia, the more one wanted to see. It was full of interest and full of encouragement. Even in spite of the bad seasons, such as had been experienced in parts of Queensland, one could see enough to indicate what a wonderful country they had in this great Commonwealth. It was perfectly astonishing. They could rely upon it that when he went back to England, Australia would have no truer friend and no warmer advocate of its possibilities than himself. He would do what he could to let the people know more clearly what Australia was. It was not until he came out here that he realised how little the people of England knew about Australia. Now, however, the people at home had at last awakened to the fact that there in the Southern Seas was a golden opportunity for men and women with pluck and good physical strength such as existed nowhere else in the world.

Flock Improvement in Central Queensland.

While Central Queensland, at least the western areas, are especially adaptable for sheep-breeding, having the finest country possible in the world for this purpose, and while Central Queensland is noted for its splendid wool, yet the care and attention given by the growers—or a majority of them—has been the deciding factor. They have not hesitated to import the best of rams and ewes, giving high prices, to improve their flocks. There are now many noted flocks both among the pastoral lessees and the grazing farmers, whose enterprise is reflected in the prices they receive for their wool. At the recent ram sales in Brisbane Mr. R. Stevenson, of Smiths' Lagoon, on the Lower Barcoo, purchased eighty-nine rams. Mostly they came from Mr. H. M. Collins' "Lamara" Stud in South Australia. The balance were from Messrs. H. C. Collins and Co.'s Lucerndale Stud in South Australia and Mr. Thos. Millear's Deniliquin Park Stud in New South Wales. Fine big fellows they were, showing any amount of quality, with a good staple. When one sees the small men, as the grazing farmers are generally known, making important purchases like this there is no reason to fear for the sheep industry or that the quality of our sheep will deteriorate. The owners are to be congratulated upon their enterprise in making such a valuable purchase.—"The Capricornian."

The Feed Factor in Dairying.

The value of better feeding methods in relation to dairying is referred to in a letter received from Mr. Geo. H. Walker, of Wollongong. "For upwards of fifteen years," he says, "I have kept a cow for household use, but have never considered the question of a balanced ration until I read the article by Mr. A. H. Haywood in the April, 1923, 'Gazette.' For years past I have been content to get enough milk for daily use, but the article determined me to try the ration quoted, consisting of maize (cracked) 30 lb., bran 20 lb., oats (crushed) 10 lb., and linseed meal 5 lb., feeding 1 lb. of this mixture daily for every 4 lb. of milk yielded."

This ration was supplemented with a kerosene tin of chaff at each meal, and maize meal was used instead of cracked maize, as the cracked maize was passed undigested, probably owing to lack of roughage. The cow (a pure-bred Jersey on second calf) was confined to an allotment of 200 ft square.

From 7th June, 1923, to 6th March (273 days), she yielded 6,266 lb. of milk, and although butter-fat tests were not carried out sufficiently systematically to have great significance, the results of the experiment have been so satisfactory to Mr. Walker that he has advised several progressive local farmers to set aside two or three cows and to feed them according to the recommendation quoted, their performances to be subsequently compared with those of selected cows fed under usual conditions.—"Agricultural Gazette of N.S.W.," for August.

Management of the Bull.

The bull constitutes 50 per cent. of the breeding herd. The selection of a bull to head a herd is very important. Breeding cattle, whether they are females or males, should be purchased subject to the tuberculin test and a sixty or ninety-day retest. In the selection of a bull the conditions under which the bull has been kept must always be taken into consideration. Bulls that have been pampered and fitted several times for shows are sometimes a disappointment. In changing bulls it is advisable to keep the old bull until the newly acquired animal has been proved satisfactory.

An improperly managed bull frequently develops into a troublesome and, in some cases, a vicious animal. On the other hand, a properly managed bull will not cause any more trouble or care than a cow.

A double ring should be placed in the nose of every breeding bull, and he should be taught to lead by a strap or staff. He should be provided with well-bedded, dry sleeping quarters during the cold weather, and his pen and lot should be well drained to prevent excessive dampness and mud.

It is advisable to begin conditioning the bull about six weeks or two months prior to the time that he is to be put into service. The ration for conditioning should contain more protein in proportion than a maintenance ration. Conditioning for service consists of increasing the vigour, vitality, and durability of the bull, thus producing a more potent and active breeder.

The frequency of service will depend upon the age and condition of the bull. The service should be less frequent in the beginning of a season. Bulls under two years of age should not be put to service more than once or twice monthly, until they are proved. Potency of a bull is frequently diminished by excessive service while the animal is immature.

Bulls should be removed from service at the first indication of over-work, placed in comfortable quarters, and if the testicles are swollen a competent V.S. should be called. The length of time that overworked bulls should be kept out of service will depend upon the vitality of the animals, and will vary from ten days to a month, and in extreme cases perhaps longer.—A. T. Kinsley, in the "American Hereford Journal."

Phosphates and Feed.

That there is a close relationship between the quality of pasture and the constitution, robustness, vigour, health, and production of animals feeding on it is explained in a bulletin just published by the Victorian Department of Agriculture, and written by Dr. A. E. V. Richardson, M.A. Dr. Richardson proves by illustration that there is a close relationship between the chemical composition of the soil and the character of the grass grown on the soil. In tests carried out by Miss Hilda Kincaid, at the Melbourne University, it was found that some Australian grasses have a markedly lower phosphoric acid content than those of Europe, also that acclimatised European grasses have a much higher phosphoric content than native Australian grasses, but lower than the same kinds of grasses grown in Europe. This weakness must reflect itself in our sheep and cattle, because in combination with lime and magnesia phosphoric acid forms 85 per cent. of the ash of bones. Animals fed on foods deficient in phosphates soon become abnormal, exhibiting weakness of limbs and debility, as in cripples, while if the diet is made normal, they gradually recover. By using phosphates at the Rothamstead Experiment Station, England, the phosphatic content of grasses was more than doubled, and that of the legumes (clovers and trefoils) was increased by 80 per cent. As Dr. Richardson says:—"Being richer in phosphates, the grass on the manured land will be especially valuable for ewes in lamb, for dairy cattle, and for young growing stock."

Moreover, it is shown that top-dressing stimulates deep rooting habits—beneficial whenever and wherever drought conditions are likely to prevail—encourages early growth, economises the use of soil moisture, and "increases the bulk, succulence, and palatability of the herbage on grass land." Finally, superphosphate is declared to be the most effective form of phosphates to use, because it becomes so readily available to the plants. Thousands of dairymen and sheepmen in Victoria have had practical proof on their own holdings of the accuracy of the deductions made by Dr. Richardson, and those who have not are obviously neglecting to sensibly nurse their soils and the animals in their care, independent altogether of the fact that they could make more money out of their properties by top-dressing. If they have not already done so, they should lose no time in putting the lessons of science into practice, for, according to Dr. Richardson, top-dressing, combined with a sane system of grass improvement, is capable of increasing production as greatly in the grazing area as manuring has influenced it in the Wimmera.

Allocation of Durango Cotton Seed.

In the course of a recent Press interview the Minister for Agriculture (Hon. W. N. Gillies) stated that the seed of the Durango variety of Upland cotton is being allotted and distributed by the Department of Agriculture and Stock to the various districts which have been selected by the Fieldmen of the Cotton Section of the Department. In making the selections of these districts the officers responsible for the distribution of the Durango seed have endeavoured to secure areas isolated from any planting of ordinary cotton, by at least half a mile—the distance of isolation which is considered necessary to prevent cross-pollination between cotton varieties. The task is a difficult one now that ratooning is permissible, and it has been found necessary to omit many sections on this account. Small individual plots of Durango have also been distributed throughout the whole portion of the cotton belt of the State in order to test the suitability of the districts in which it has not been possible to allot any group areas. Seed for only 10,000 acres of Durango is being distributed, and, of course, it is impossible to satisfy all demands. It is anticipated, however, that the seed from this acreage will be sufficient to meet all demands in future and to plant up to 300,000 acres in the following season.

Stallion Clubs in Canada.

The policy of making grants to clubs that hire approved stallions, says a recent report of the Canadian Minister of Agriculture, was started in 1915, the scheme (which is based on the "Scottish premium system") providing that any district which forms a club for the purpose of hiring an approved pure-bred stallion, and which complies with the regulations, is paid a grant equal to one-third of the amount paid by the club members as fees to the stallion owner. By this means the owners of mares and the proprietors of good stallions are both benefited. The former are enabled to secure the services of a first-class horse at a very nominal fee, while the latter are assured by contract of a certain definite return from the service season. Thus the keeping of good stallions is made possible, while community breeding and better feeding, care and management are encouraged among the mare owners.

The organisation of communities for the purpose of hiring a stallion has in many cases only been one phase of the work. Colt shows have been established, which have done much to create an interest in better breeding and at the same time have been the cause of leading the breeders to study all phases of the question in an endeavour to produce winners. Community horse sales have also been carried on in certain districts, and a healthy rivalry has sprung up in sections as to which club will secure the services of the best stallion.

Clubs are required to stick to one breed, and thus grade up a definite type in the community. All stallions for club use are inspected by experienced horsemen and judges, only sound, individually excellent animals that possess the size and characteristics of the breed required being allowed to stand for service.

Staff Changes and Appointments.

Messrs. Henry Barnes, Albert Edward Taylor, William Stanley Collins Warren, Francis O'Connor Cassady, and Herbert Hungerford Batchelor have been appointed officers under and for the purposes of "*The Animals and Birds Act of* 1921."

During the absence on leave of Mr. F. F. Coleman, Expert and Inspector under "*The Pure Seeds Act of* 1913," Mr. F. B. Coleman has been appointed an Expert for a period of six weeks as from the 14th September, 1924.

Acting Sergeant W. E. Corney, of Bowen, has been appointed an Inspector of Slaughter-houses as from the 1st September, 1924.

Messrs. R. L. Prest, H. St. J. Pratt, F. L. Jardine, and S. E. Stephens have been appointed Inspectors under "*The Diseases in Plants Acts, 1916 to* 1924." The appointments will take effect as from the 20th September, and will be on probation for a period of six months.

W. C. Keany, who has been Poultry Instructor for the Department of Agriculture and Stock at Townsville, has resigned his position.

Constable T. J. Quinn, of Calliope, has been appointed an Inspector under and for the purposes of "*The Slaughtering Act of* 1898," as from the 5th September, 1924.

W. M. Wheatley, Cinnabar, has, on the recommendation of the Council of Agriculture, been appointed Chairman of the Peanut Board.

The resignation of Mr. John Armstrong as Government Representative on the Tambo Dingo Board has been accepted, and Mr. F. L. Barry has been appointed in his stead.

The Value of Colour in Milk.

Colour in milk is a point of some commercial value, says F. J. Doan, of Maryland Agricultural Experiment Station, in the "Journal of Dairy Science," the average consumer prefering a yellowish milk, thinking it to be richer in cream (butter-fat) than whiter milks. While this is true in general of milks where the pigmentation of the fat is approximately equal, it does not hold in the majority of cases. The demand for yellowish milks should, however, be encouraged for quite another reason.

It was at one time suggested that carotin and fat-soluble A vitamin were identical, or at least were always found associated. While this theory has been disproved, it is still a fact that milk from cows fed on ample quantities of green vegetation is higher in vitamin content than milk from cows feed on bleached hays, silage, most roots, and grains. Thus it follows that summer milk is richer in vitamins than winter milk under prevailing American and European conditions of production.

In a final analysis, says this writer, it may be found that the colour of cows' milk or the colour of milk fat is of no great importance, but from our present knowledge colour does seem to be an indication of the vitamin A value of milk used for a food, and possibly an indication of the presence or absence of other vitamins as well. This statement applies only to milk produced under conditions referred to.

Manufacture of Home-made or Dairy Butter.

Presuming the cream and a hand churn are available, let the cream ripen until it is sour to the taste, then put it in the churn at a temperature of, say, 55 deg. Fahr. The air vents should be opened after the first few revolutions to let off gas, and this should be repeated three or four times at half-minute intervals. Revolve the churn or turn the beaters so as to agitate the cream for about thirty to thirty-five minutes. The glass on the churn should then show slight signs of washing clear; add a little cold water to the cream, taking the lid off the churn to do so. Having added water, say 1 pint to a gallon of cream, set the churn going again until butter is in granular form about the size of shot; open the drain taps and drain off the buttermilk. Add cold water until the butter grains float freely; revolve the churn for half a minute and drain off; add a fresh lot of water, revolve again, and also drain this off. This wash water should come away clear or with just a very faint milky tinge.

Now take the butter out of the churn and add fine powdered salt at the rate of about ½ oz. to 1 lb. of butter. If mildly salted butter is desired, add a little less than this; if a distinct salt flavour is desired, add a little more, but do not exceed ¾ oz. Work the salt thoroughly through the butter with pats, touching it as little as possible with the hands. A small roller worker can be purchased for this purpose. Let the butter stand for at least six hours so that the salt may melt thoroughly, then rework for about five minutes, taking care not to work too much, or it may become greasy.—L. T. MacInnes, New South Wales Dairy Expert.

Calf Selection.

A good deal of culling is possible each spring, not so much amongst the mature cows as amongst the calves. Many dairy farmers make a point of saving all heifer calves, others again make a point of killing them as soon as they are born. Either extreme is harmful, because in one case many are kept that should not be allowed to live, and in the other case many that would become valuable are never given a chance. It is not at all likely that even the good cows will always produce good calves, but it is a certainty that the poor cows will usually throw poor calves. There are certain infallible guides to selection, and amongst the most important comes trueness to type and the money-making organs properly developed. In the case of dairy cattle the young heifer will show at the moment of its birth whether or not the udder is properly formed and developed. If dairy farmers would just make a careful examination of the heifer calves they would be able to do a good deal of their culling at that stage. Even the best-developed calf may go wrong, but the worst-developed ones will never come right. Select for rearing only those calves that have the udder well spread with the teats well placed and apart. There are indications there of good milking capacity, and that is usually what the calves are being kept for. There is no profit in feeding poor ones; rather concentrate on fewer animals that have the makings of good ones. The whole land is entering into the busy season of the year, when it is a case of going from daylight to dark. At the moment it would appear as though the prospects ahead are good, and it is to be hoped that the markets will remain good, so that there will be a payable return for our produce.—"New Zealand Farmer."

A Profitable Co-operative Venture.

An interesting experiment in practical co-operation was described in an address at the recent State conference of the New South Wales Agricultural Bureau, when the saving to be effected by pool-buying of farm and household requirements was brought before the notice of delegates by Mr. F. P. McFarlane, the representative from Yarramalong.

It was in 1921 that it occurred to members of this branch of the Bureau that they might increase the purchasing power of their earnings by buying on a better market, an order for £26 worth of goods being made up by six members, and one member being appointed buyer and distributor on a percentage basis. The first order proved such a success that the next one was increased to £40, with more buyers, and the third order to £300, with about forty buyers, since when the branch has turned over about £8,000 worth of such requisites as groceries, boots, fertilisers, seeds, and farm implements.

It soon became necessary to build a store and alter the method of distribution, a motor lorry being eventually used and a second member employed. Success had been achieved, it was stated (1) by allowing no credit, (2) by retailing the goods plus bare cost, and (3) by making the share or deposit only small, a member being required to find only £1, which he lent to the branch on call. The funds of the branch when the movement was started amounted to only about £28; the assets were now worth at least £250, a sum which had accumulated principally as an over-run on goods distributed. Bad debts amounted to less than £3. The saving effected had been more than 10 per cent., but estimating it at that figure £800 had been retained in the pockets of members, to say nothing of the effect of the activities of the branch on local prices.—"Agricultural Gazette of N.S.W." for August.

Transfer of Banana Plants.

A Proclamation has been issued under the Diseases in Plants Act permitting the transfer of banana plants from one part of Queensland to another, excepting the region described as follows:—

> All that portion of Queensland commencing at Double Island Point, and bounded thence on the north by a line bearing westerly to a point ten miles due west of Gundiah, on the Main Northern Railway Line, on the west by a line bearing southerly to a point five miles due west of Brooloo, on the south-east by a line bearing north-easterly, through Pomona to the coast; and thence by the coast to the point of commencement.

Banana plants may be removed from the area described above on the following conditions:—

(*a*) The whole of the stem and leaves of the plant to be first removed from the corm;

(*b*) All roots and loose material removed from the corm;

(*c*) When banana weevil borer is present in the nursery, orchard, or place from which the corms are being obtained, no corm shall be taken from any stool of bananas in which any weevil borer or any trace of a weevil borer is visible, and, further, no corms shall be removed from such place unless and until they have complied with the foregoing conditions, and with conditions as follows:—

That all ground within the distance of three yards from the place where such plant so to be removed is or has been growing is and has been kept in a state of thorough cultivation for at least twelve months prior to the digging of the plants;

That every plant so treated shall be at once placed in a cart and removed from the place where grown in such manner as to prevent its coming in contact with the soil, and then forwarded direct to its destination, or stored on a framework raised at least 2 feet above the ground and not less than 200 yards from the nearest banana plant;

(*d*) Any banana plant removed under the provisions of the Proclamation shall at all times during its removal have attached to it or to the package or crate wherein it is contained, a certificate to the effect that such plant or plants comply with the conditions laid down in the Proclamation dated the 2nd October, 1924, and published in the *Government Gazette* of the 4th October, 1924, such certificate to be signed by the occupier of the nursery, orchard, or place from which such plant is being or has been removed.

This Proclamation does not refer to the fruit of the banana, and does not apply to the State Nursery at Bribie Island.

A Correction.

Among the general notes in the last issue (September) of the Journal there appeared a paragraph headed "Bananas in Western Queensland." "Bananas" should have read *Tomatoes*. To associate bananas with the context of the paragraph would be plainly absurd. The obvious error was due to a clerical oversight.

Agriculture on the Screen.

Motion pictures have been used by the Live Stock Branch during the past two years. Some strictly technical films have been made. Scenarios are prepared by officers of the Branch, who also superintend the locating of suitable settings for the pictures, the necessary properties, and other details. Although there is a certain disadvantage in the treating of highly technical subjects, this will be practically eliminated by the use of a projection machine with a special shutter, which allows for the stopping of the machine at any particular scene. The programme of the meetings at which these pictures are shown is usually arranged to provide some variety. The motion picture as a means of actually depicting agriculture in all its varied phases is increasing in popularity. Officers report good results from the use of the pictures, which are in increasing demand.—W. R. Motherwell, Canadian Minister of Agriculture, in a recent report.

HOME-MADE BROODER.

The suburban poultry-keeper who has been using brooders of the pattern illustrated for some years does not claim any originality for the design, but states that he is perfectly satisfied with the results obtained from its use. Fig. 1 shows a vertical section of the brooder; Fig. 2, a perspective view; and Fig. 3, F, the slide to

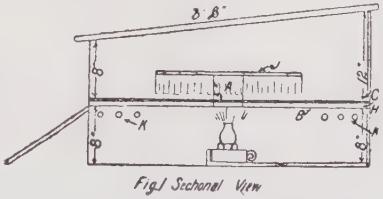


Fig. 1 Sectional View

carry the lamp. A is a tin cylinder made by cutting out the top and bottom of a fruit tin. This reaches through a circular hole cut in the floor, C, down to the galvanised iron sheet, B. This galvanised iron sheet, B, is 1 in. below the wooden floor, C, and by means of it the heat is distributed over the whole of the floor and through to A. The floor, C, is made of lining boards, and as previously stated, is

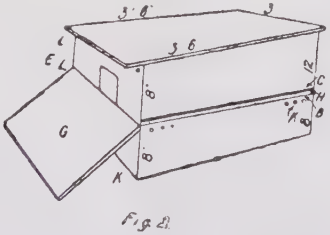


Fig. 2.

1 in. above B; and has a circular hole in the centre, to allow passage to A. The lid, D, made of flooring boards, just rests on the top of the walls, and can be lifted off. A circular piece of wood, J, 2 ft. in circumference, rests on top of the cylinder A, and has a strip of blanket tacked round it, the blanket just reaching to the floor,

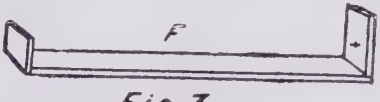


Fig. 3

and being cut into strips about 3 in. wide, a little over halfway up, to allow chickens to go in and out. The exit for the chickens, E, is fitted with a drop shutter. The platform, G, makes it easy for the chickens to run in and out. Ventilation holes, K, in the lamp compartment allow the fumes to escape. Air holes, L, are also provided for the top compartment. This brooder will hold 100 chickens.

Answers to Correspondents.

Pig-Raising.

G.W.L. (Brisbane)—The Instructor in Pig Raising, Mr. E. J. Shelton, advises:—

(1) *Amount of capital required to engage in Pig Raising?*—This is a difficult question to answer. The writer has known men start with £10 and eventually succeed in making a comfortable living. On the other hand, it would be a decided advantage if capital were available to the extent of, say, £500 to £2,000. There is no limit to the amount that could be invested nor is there any minimum. The purchase of the farm will, of course, be the largest item, whether this is purchased by cash or on terms will make all the difference. To go in for pigs on the paddock system nothing less than 50 acres should be acquired, and if 100 acres are available it will not be too much. Suitable improved land can be purchased at up to £20 per acre on terms, or if unimproved land is taken up it will, of course, be cheaper. The amount to be spent on buildings will, of course, vary considerably. Suitable buildings may be erected at comparatively low cost by a farmer who can do carpenter's work. At any rate, convenient sanitary buildings are a necessity, and we hope at a later date to have a pamphlet issued dealing with the construction of pigsties. The purchase of breeding stock is an important item. The writer considers that to make a living out of pigs at least thirty breeding sows and two boars are required. Of course these would not all be purchased at one time, but would be secured as required. It is first necessary to have the farm and a liberal food supply before taking on the breeding stock.

(2) *District Most Suited for the Purpose.*—There are many districts in Queensland suited to pig-raising. Some are near at hand as in, say, the Fassifern Valley, where there are extensive areas of rich land available at from £15 and £20 per acre improved. Then further afield there is the Atherton Tableland, where some of the finest land in the State is available at from £5 to £20 per acre improved.

(3) *Type of Pig Most Suitable.*—The most suitable type of pig will depend to some extent on local conditions. If you are situated in a district where there is likely to be a good demand for breeding stock, it would pay to specialise in a breed like the Berkshire and have young pigs available for sale as breeders to farmers. On the other hand, if you are situated away from a local market, it would probably pay to breed bacon pigs, and for this purpose a purebred Berkshire boar and crossbred Tamworth-Berkshire sows or grade sows generally will be found suitable. If you are prepared to make a speciality of pig-raising, then by all means specialise in purebred stock.

(4) *Disposal of Stock when Produced.*—There is an ever increasing demand for all classes of pigs; the largest demand in Queensland, however, is for light to medium weight bacon pigs, varying from 5½ to 6½ months old, and in weight from 105 to 120 lb. dressed weight—*i.e.*, from 150 to 170 lb. live weight. You need have no fear of over-supply; the bacon factories are capable of treating all the pigs likely to be available for some years to come.

There is a growing demand for store pigs also; this is purely a local market, but it is one that is worthy of consideration.

(5) *Where to Secure Stock.*—When you are ready we will be pleased to put you in touch with breeders who have stock for sale.

(6) Pig-raising is largely an adjunct to dairying and mixed farming; neither of these industries is confined to what might strictly be called coastal areas. The Murgon-Kingaroy districts, for instance, are large pig-raising centres; they can hardly be classified as coastal areas. At the same time pig-raising is not altogether a suitable industry for what are commonly regarded as "out back" districts.

(7) There should be no difficulty in getting in touch with breeders who are competent to give you a few weeks or months' practical training. We are forwarding you a copy of the August issue of the Journal. If not already a subscriber, you should fill in the order form which will be found among the advertisements.

Passion Fruit Injury.

S.K.R.R. (The Gap)—

The Director of Fruit Culture, Mr. A. H. Benson, advises that, judging by the specimen of passion fruit submitted, the injury was probably caused by a sucking bug when the fruit shell was soft on the vine. These bugs are fond of the prickly (African) cucumber, and may be attracted by slices of the cucumber. If the slices are treated with arsenical poison the bugs will be destroyed in large numbers.

Swingle Bar—Cementing Old Tank.

C.E.B.W. (Tweed Heads)—

(1) Mr. A. E. Gibson, Instructor in Agriculture, advises that, in order to make a three-horse plough bar, the "B" bar should be 4 feet 9 inches long. Allowing that the pull is taken at 1 inch from each end of the bar, this would give a distance of 4 feet 7 inches in between; consequently the line of draught should be taken at a distance of 19⅛ inches from the extremity of the bar on the left-hand side.

(2) Cement washing of the outside of the tank is recommended, even if the question of expense of plastering is not entertained. The wire netting alternative inside the tank is not thought practicable. Follow the general directions as to how to repair a leaky tank which you quote and which was published in the Journal for January, 1919. The strength of the tank stand is obviously an important factor. Perhaps you would find it more economical to replace the old tank with a new one.

Hog Lice—Poland-China Pigs.

W.F.L. (Boonah)—Mr. E. J. Shelton, Instructor in Pig-raising, advises:—

1. The most efficacious treatment for lice is to prepare a mixture of—Benzine, ½ pint; kerosene, ½ pint; crude oil or fish oil, 7 pints. This makes up into a gallon of mixture which should be stored in a tin container for use as required. Before applying the oil, place the pigs in a clean pen and wash them well, using lukewarm water and either Sunlight soap or soft soap. After the pigs have "dried off" apply the lice mixture by hand, rubbing it well into the crevices behind the ears, along the neck and sides, and on the hind legs. Be careful also to see that some of the mixture finds its way just inside the ears, where lice congregate freely. Keep the pigs in the pens for three days, then give them a second oiling; this is necessary by reason of the fact that the eggs ("nits") of the lice hatch out in three days after being deposited by the female lice on the hair, &c.; the second application of lice mixture catches this young brood and destroys them. After this treatment it should not be necessary to treat the pigs for some months, but it pays to be constantly on the lookout for these parasites. Cleaning up the pens, white-washing, &c., are also effective in getting rid of them.
2. The Poland-China will be found a very useful type of pig for cross-breeding in the manner suggested by you. It is a quick-growing, early-maturing, easy-feeding type suitable both for porkers and for light to medium bacon pigs.

   If you state the number and sex of the Poland-Chinas you require, we shall be pleased to put you in touch with breeders of this type. The writer will be inspecting some at Broxburn, near Pittsworth, shortly, the property of Mr. J. H. Whittaker.

A USEFUL HEALING OINTMENT.

The following prescription is well worth note. It is of a useful healing ointment for application to open wounds, such as those resultant upon castration or operations on abscesses. The wound should be thoroughly cleansed before applying the ointment, and until healing takes place the pig should be kept separate from the rest of the herd in a clean, dry sty.

The ointment is composed of—

Iodoform	1 part.
Oil of Eucalyptus	14 parts.
Olive oil	20 parts.

It should be kept in a clean porcelain or glass container, and should be on hand at all times in case of emergency.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Farm and Garden Notes for November.

FIELD.—Farmers are commencing to realise that quick-maturing wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plants. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growth fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kafir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghum have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

Orchard Notes for November.

THE COAST DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, excepting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for

bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools being overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young pawpaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit, it appears to be covered with a grey dust, and if the fruit is examined with a good lens it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruit that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

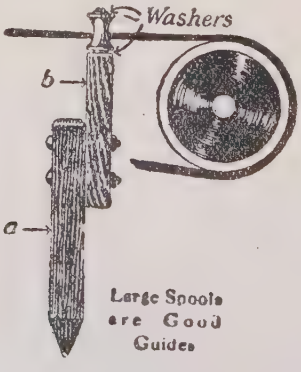
THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be continued, and all pip fruit trees must be bandaged the beginning of the month; further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruit profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully, and, on its first appearance in a district, all ripening fruit should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

A ROLLER BELT GUIDE.

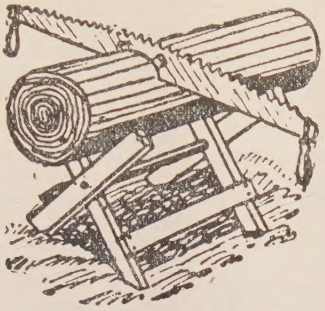
On belt-driven machinery where the load is intermittent, it seems impossible to prevent the belt being thrown off the pulleys frequently without some form of belt guide. The usual form, a piece of board or similar expedient, will wear and fray the edge of the belt. A better plan is to use large spools as guides. These are mounted so as to turn easily on large nails or screws. Where the machinery is out of doors the plan shown in the illustration can be used. Bolted to the top of the



pointed stake, A, is a piece of board, B. This arrangement is used so that we will be able to drive the stake in the ground where required, the spool being mounted on top as shown. To be effective the spools must be so placed as to guide the belt just before it goes on the pulley. They should also be placed far enough away from the edge of the belt so that they do not ordinarily touch it, but come into play only when the belt runs too far to one side or the other.—"Country Gentleman."

FILING CROSSCUT SAWS.

Large crosscut saws used for sawing logs are, owing to their size, difficult to file when sharpening them without the aid of a vice. Experienced woodsmen employ the slot-and-wedge method of holding the saw, as shown in the drawing, which



Fitting Crosscut Saws.

appeared in "Popular Mechanics." A deep slot is cut across a log or heavy timber and the saw is placed upside down in the cut. One or two small wooden wedges are then driven in the cut to hold the saw securely in position, and it can then be filed readily.

SACK SEWING.

Records for bag-sewing are often claimed in harvest time, and to secure big tallies the method of sewing must be systematised. A recent pamphlet, issued by the Californian Experiment Station, teaches by illustrations a quick method of doing this work, which might be used as a guide to the inexperienced. The equipment consists of a spring-eyed twine needle, with fore part of eye sharpened to cut the loop of the string at the finish; a needle file, to keep the eye sharp, and an oilstone to keep the edges sharp. The skein of twine is cut at one end, and braided loosely,

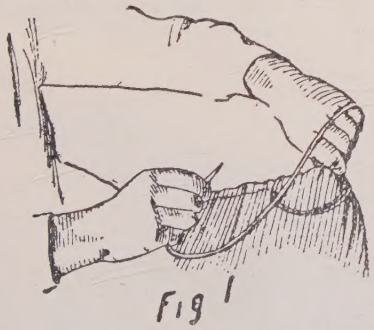


Fig 1

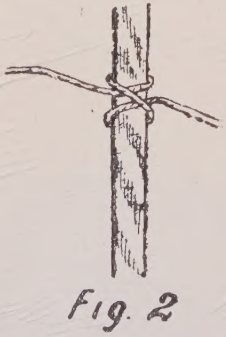


Fig. 2

making strings about 3 feet 9 inches long when doubled. The first two sacks sewn form a seat, and the twine is placed on this with the loop ready to the right hand. The filled sack is placed between the knees with the side seam on the far side from sewer. The instructions run thus:—Bring the edges of the sack nearly together by flattening the sides near the top with the hands, taking care to crowd the grain well into the corners, and to have the left edge slightly higher than the right. Take the threaded needle in the right hand. With the left hand well toward the right side, palm upward, draw the string across it. Roll the left hand toward the body, taking care to pass the fingers over the string, then under it, giving the string a complete wrap around the hand. With the right hand, place the string around the farther ear of the sack by making a quick turn around it in a direction opposite to that of the hands of a clock. Then grasp the ear with the left hand, and allow the string to slide off the hand and make a turn around the ear, thus completing a loose clove hitch (Figs. 1 and 2). Twist the ear firmly in a direction opposite to the clock with the left hand, and draw the string up tight with the right. If properly

done from 4 to 5 inches of the cut end of the string will be unused, and the left edge of the sack will overlap the right. These should be done as a continuous series of motions, and the more quickly the better. Take the first stitch close to ear just finished. Do this by sticking the point of the needle that projects beyond the fingers of the right hand through both edges of the sack just below the finished part or hem. Let go of the blade of the needle with the fingers. Push the needle nearly through with the palm of the hand. Then roll the hand toward the left and over the seam. Grasp the needle again with the fingers of the right hand, and finish pulling it through. As subsequent stitches are being taken, grasp the edges of the sack with the left hand, pull them close together, and tuck the right edge under with the left thumb, keeping just ahead of the needle. Take three stitches in rapid succession. Then tighten the string by pulling it up with the right hand, assisted by the left if necessary. Space stitches evenly, from 1 inch to 1½ inches apart, or so as to have from eight to thirteen stitches in the seam, depending on the fineness of the grain or other material in the sack. With the needle and right hand to the right of the sack, place the left hand, palm upward, under the string. Roll it toward the body, the fingers passing over, then under the string, thus forming a wrap around the hand. Grasp the ear with the fingers of the left hand, and permit the string

Fig 3

to slide off the fingers (Fig. 3). Twist the ear firmly in a clockwise direction as the string is being tightened. Repeat the previous motion, thus forming a clove hitch around this ear also. As the string is being tightened around the ear the last time, hold the needle so as to allow the string to pull against the sharp part of the eye. With a quick backward swing of the right hand cut the string, and at once hang the needle on a loop of unused twine. By practice these motions can be carried out with great rapidity and mechanically.

FLY TRAPS.

The Entomological Division of the Department of Agriculture of South Africa has designed an improved trap, particulars of which are:—

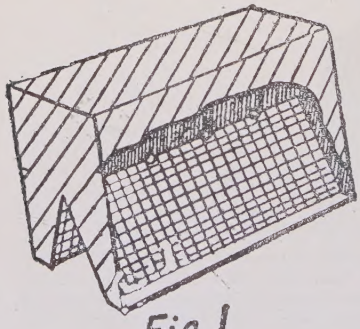


Fig. 1

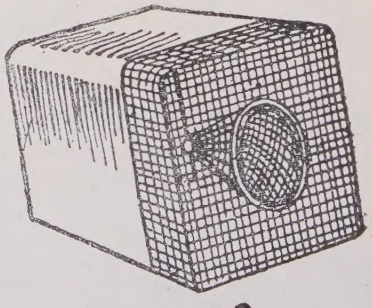


Fig. 2.

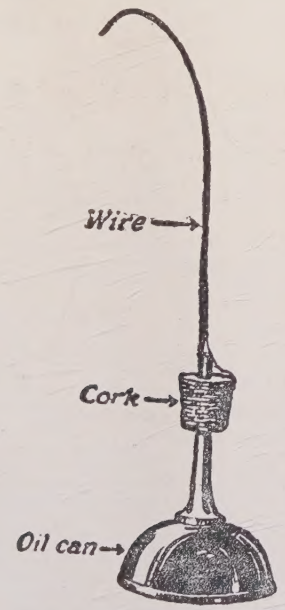
Fig. 1 shows a type of one home-made which any one can make. A handy-size for stable or outdoors is a kerosene case. A smaller box will do for the house. A wedge-shaped opening is cut in each end of the box about 6 inches deep, the base of the wedge being on the top of the box. A piece of fly-wire is nailed over the

opening thus made, being folded to fit the sides of the wedge. Two or three holes, about 3.16 inch in diameter, are placed about 3 inches apart along the ridge of the wedge to allow the flies to enter. A doorway is cut in one side for removing dead flies. The trap is placed with the top on the ground, and baited inside with a lump of stale crust soaked in milk, which is suspended from the roof of the trap. For blowflies the holes should be larger, and a piece of meat used as a bait. Fig. 2 shows a style of trap recommended in New South Wales, and constructed from a petrol tin, with a top of fly-wire in which is inserted a cone-shaped opening with a hole at the apex of the cone. The bottom is watertight, and is filled with a few inches in depth of water, in which is put a piece of meat as bait. The flies crawl through the hole to the bait, and fly upwards to the light to escape, but crawl all over the fly-wire without finding the hole, and eventually fall into the water. The top can be lifted off to clean out the trap.

A LONG-RANGE OIL CAN.

The ordinary oil can, with its short, straight spout, cannot reach around sharp corners nor squeeze into tight places. Even the can equipped with a longer spout that curves at the tip will not always serve to meet all needs. For example, to oil all parts of automobile springs with an oil can is an impossible task; therefore we make shift to do the best we can with an old brush, swabbing the oil messily over the entire spring with the hope that part of it will reach the points where squeaks are hiding.

But there is a far better way. Take any kind of an oil can. Slip a 1-in. cork over the end of the spout, as shown in the accompanying illustration. Then cut off



The Wire Carries Oil into the Most Inaccessible Spot.

a piece of stiff, clean wire, about 1 ft. in length. Insert one end of this into the cork close alongside of and touching the spout. The extension spout is completed.

Here is how to use it. Bend the wire into any shape required to reach the point where oil is to be placed. Then "thumb" the can as usual. As long as the general trend of the wire is slightly downward the drops of oil will course down its length in a steady stream to its end. Few will drop off en route. With the curved wire extension, there is no place on automobile springs, no crevice on farm machinery so inaccessible that the small bent wire will not serve to conduct oil to readily. Body squeaks, the bane of the life of every motorist, may be silenced with the simple device in a jiffy. In fact it has any number of everyday uses.—"Country Gentleman."

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1924.	October.		November.		December.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5·33	5·50	5 3	6·9	4·51	6·32
2	5·32	5 51	5·2	6·10	4·51	6·33
3	5·31	5·51	5·1	6·11	4 50	6·34
4	5·30	5·52	5·0	6·12	4·50	6 35
5	5·29	5·52	5 0	6·13	4·50	6·36
6	5·28	5·53	4·59	6·13	4·50	6·36
7	5·27	5 53	4 59	6·14	4·50	6·37
8	5·25	5·54	4·58	6·14	4·51	6 37
9	5 24	5 54	4 57	6 15	4·51	6 38
10	5·23	5 55	4·57	6·16	4 51	6·39
11	5·22	5·55	4·56	6·17	4 52	6 39
12	5·21	5·56	4·56	6·18	4·52	6 40
13	5·20	5·56	4·55	6·18	4 52	6·40
14	5·19	5·57	4 55	6·19	4·53	6 41
15	5·17	5 58	4 54	6·20	4·53	6·41
16	5·16	5 58	4·54	6·20	4·53	6·42
17	5·15	5·59	4·53	6·21	4 54	6·42
18	5·14	6·0	4·53	6·22	4·54	6·43
19	5·13	6·1	4·52	6 23	4·55	6·43
20	5·12	6·1	4·52	6·24	4·55	6·44
21	5·11	6 2	4·52	6·25	4·56	6 45
22	5 10	6 3	4·52	6 25	4·56	6 45
23	5·9	6·3	4·52	6·25	4·57	6·46
24	5·9	6·4	4 51	6·27	4·57	6·46
25	5 8	6 4	4 51	6·28	4 58	6·47
26	5·7	6 5	4·51	6·28	4·58	6·47
27	5·7	6·5	4·51	6 29	4 59	6·48
28	5·6	6 6	4 51	6 30	5·0	6·48
29	5·6	6 7	4·51	6 31	5 0	6·49
30	5·5	6·7	4·51	6 31	5·1	6·49
31	5·4	6·8	...	...	5·1	6·49

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

6 Oct.	☾	First Quarter	12 30 a.m.
13 „	○	Full Moon	6 21 a.m.
21 „	☽	Last Quarter	8 54 a.m.
28 „	●	New Moon	4 57 p.m.

Perigee, 3rd and 30th October { 3 6 p.m. / 12 12 a.m.

Apogee, 18th October .. .. 6 18 p.m.

On the 10th October, at 8·17 p.m., Uranus will be in conjunction with the moon about three times the moon's diameter below it. This should be observable in binoculars.

On 22nd October, at about 10 p.m., Regulus will be occulted by the moon at Thursday Island, but not at Cooktown or Cairns, where Regulus will appear just above the edge of the moon; further south the distance between Regulus and the moon will appear greater.

On the 26th October, at 1·0 p.m., Mercury will be in superior conjunction with the sun—that is, on the far side of its orbit bepond the sun, where it will be quite invisible. Venus will be a morning star, and Saturn, Jupiter, and Mars will be visible in the evenings during this month.

4 Nov.	☾	First Quarter	8 18 a.m.
11 „	○	Full Moon	10 0 p.m.
20 „	☽	Last Quarter	3 38 a.m.
27 „	●	New Moon	3 15 a.m.

Apogee, 15th November, 11·0 a.m.
Perigee, 27th November, 10·36 p.m.

Venus, still the most brilliant morning star, will be about five degrees west of Spica (the principal star of Vergo) on the 15th; Mars on that date will be apparently amongst the smaller stars of Aquarius, setting about half-past 1 in the morning. Jupiter will be apparently amongst the stars of Scorpio about 15 degrees to the north-east of Antares. Saturn will be visible only in the east, rising about an hour before the sun.

3 Dec.	☾	First Quarter	7 10 p.m.
11 „	○	Full Moon	5 3 p.m.
19 „	☽	Last Quarter	8 11 p.m.
26 „	●	New Moon	1 45 p.m.

Apogee, 12th December, 6·36 p.m.
Perigee, 26th December, 11·12 a.m.

Mercury will be at its greatest elongation east of the sun on the 10th, and will rise and set one hour and twenty-four minutes after the sun on the 15th, apparently amongst the stars of Sagittarius. Venus will still be the brilliant morning star, rising about 2 a.m. on the 15th, apparently among the stars of Libra; Mars, having apparently reached the constellation Pisces, will set soon after midnight on the 15th. Jupiter will not be so well situated for observation, and will be lost in the sun's rays towards the end of the month. Saturn, as a morning star, will rise about half an hour before Venus in the middle of this month.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]